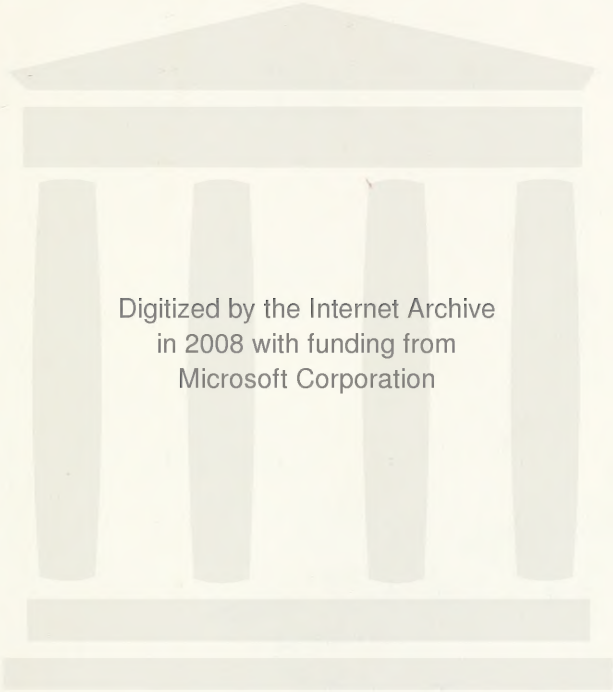

FINGER PRINTS SIMPLIFIED

A Handbook of the Science of Finger Print Identification

By

JAMES HOLT

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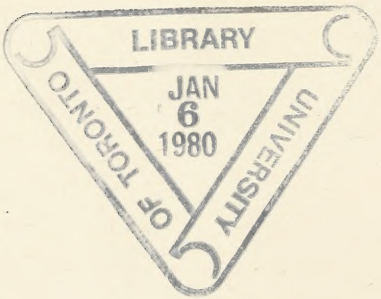

This book, I affectionately
dedicate to
EDWARD C. O'NEIL,
my friend and coworker
The Author

PREFACE

The purpose of this book is to popularize the science of finger print identification. An earnest effort has been made to set forth the rather intricate principles of finger print classification in language that can be understood by anyone. With this purpose in mind, an endeavor has been made to restrain from any display of erudition and from needless "padding," and to go straight to fundamentals. In other words, it is sought to give the reader the "A, B, C" of the art, so that he may start at once to master the subject matter and gain progressive knowledge through actual experience.

Results count. It is results that the student of finger prints has the right to expect and demand from any textbook purporting to teach the subject. In the present book, the invariable rule is to lead the student by gradual degrees from the elementals to the final mastery of the subject. Approached in this manner, there is nothing mysterious at all in the science of finger print classification or identification. It is simply a matter of taking a few simple rules and work-

ing out the problems as they arise according to well established principles.

Theoretical knowledge is absolutely valueless unless it enables one to actually produce accurate finger print classifications and identifications. For this reason, great emphasis has been laid upon the methods of producing results, rather than the historical and psychological angles of the art. Those studies are doubtless very interesting, but the acquisition of the art of practical finger print identification is in itself fascinatng, and of first importance.

It must not be assumed that this book proposes to show that the science of finger prints is one of the simplest of subjects and the most easily understood. On the contrary, it is a somewhat difficult subject and one that requires conscientious study and concentration for its mastery. Let it be remembered that this is a new science, the accomplishments and possibilities of which are only beginning to be recognized. Here it might be well to warn the student that a careless and perfunctory study will never make him an expert. And unless he is really expert in the various branches of the art, his work will be mediocre and unreliable.

And, as the student proceeds along the fascinating path of the study of finger prints, to him will be shown a new knowledge and a new science. At present we stand merely at the

threshold of the great new range of practicability revealed by the discovery of the finger print system. We are only beginning to investigate the wonder of the intricate and delicate tracing which never shows an untruth and which never repeats itself; the indelible writing of Nature upon the living tissue of humanity. A tremendous power for good or for evil lies latent in the universal prevalence of these miniature complex webs upon the finger bulbs of all mankind. Let us study, with diligence and self-discipline, this newest and most interesting of subjects; and, having mastered it, let us determine that our knowledge shall be placed only at the service of that which is true and good.

THE AUTHOR.

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CHAPTER I

THE USES OF FINGER PRINTS

Most of the publicity which has been given to the science of finger print identification has dealt with its relation to criminal investigation. This branch of the business is fairly well understood. The contrary is the rule, however, in the slight understanding with regard to the widely varied uses of finger print identification in social and business life.

Few people are aware that the use of finger print records is spreading rapidly in banking enterprises. In the industrial centers where there are large foreign communities among which the percentage of illiteracy is unusually high, the use of the finger print is securing adoption by bankers.

The depositor who cannot sign his name has always been a source of trouble to banks. Not only is there difficulty in identifying him whenever he seeks to engage in some transaction which

requires the withdrawal of his account, or part of it; but also the mark, generally made in lieu of the signature, must be witnessed by one, and sometimes by two, other persons, whose presence may also be required. Whenever the person wishes to withdraw some funds, he will be required to have identity witnesses with him; a most tedious and troublesome process both to the client and to the bank.

If, on the other hand, the depositor were required to leave an impression of his finger prints with the bank at the time of his first dealings, all this delay would be avoided.

The great value of the finger print system has been proved in this sphere by the fact that bank after bank is adopting the method. And it is used not only for illiterate depositors, but also for traveling clients, about whose identity there might be a dispute at a bank in some locality where the person is unknown.

The army, navy and marine forces of the United States have long ago seen the infallibility of the finger print system. At Washington each of these branches of the armed forces of the nation maintains its own central bureau where are filed hundreds of thousands of records.

Many are the instances of sailors or soldiers who have been found dead, and attired in civilian clothes, whose identity has been discovered through comparing the finger prints of the corpse

with the files at Washington. Many are the cases of desertion and fraudulent enlistment which have come to light through the same inescapable means.

One of the latest uses to which finger prints have been put is the registration of infants in maternity hospitals, in order to prevent the accidental substitution of one child for another.

Many families are also beginning to register the prints of their members; this being an exceptionally good precaution in the case of runaway boys. Thousands of youngsters pass through the hands of the various police departments annually. They are arrested in railroad yards when caught illegally riding trains or for other minor charges. The police are forced to believe the boy's story of his parentage, as investigation of each story would cost untold sums. These boys, because of their age, are usually let go with a stern warning.

Let us suppose, however, that upon the departure of a boy from his family, the parents immediately send his finger prints to the larger police offices and to the central record bureaus of the nation. When the lad was caught for some other offense, his prints would be taken and his identity would be known. He could then be returned to his parents; and thus a home would be brought out of misery to happiness and a life of crime and degradation checked in its beginning.

How many homes might have been spared the agony of loss and wonderment as to the whereabouts of their young, how many young wanderers might have been restored to their sorrowing families and been saved from a life of crime, if the finger print system were in general use?

There are those who advocate the universal registration of finger prints. Just as easily, they claim, as the authorities collect data through compulsory registration of births, marriages and deaths; so could they collect the finger print records of the community.

This would undoubtedly be of immense value. Until recently, the finger print system has been so closely associated with criminal detection that people have regarded it askance. But now that it is being introduced by banks, insurance companies, large industrial concerns and other institutions, they are beginning to recognize that here is something which may prove a tremendous boon to humanity.

Let us take, as another example, the frequent cases of aphasia, or the loss of memory. Thousands of cases occur every year of persons found wandering aimlessly about the streets of cities who have lost all consciousnes of their identity. Sometimes they never recover their memory, sometimes only after a long period. And, in the meantime, their families are in a condition of frantic anxiety and are perhaps plunged into the

depths of poverty. By restoration of the unfortunate victim of aphasia to his family and familiar surroundings, memory is usually restored. This could be done with far greater facility were universal finger print registration in practice. The person's prints would be taken and forwarded to the national central bureau. To discover his identity would be a matter of few minutes only; and his family would then be notified.

The various uses of the finger print system are legion. We stand on the threshold of a rapid and important development and extension of the science. As the great financial and industrial concerns and the Government take up this practice, the demand for able practitioners of the science increases. The profession of finger print expert is bound to become, and is now becoming, one of the most respected in the community.

A cursory examination of the daily press will reveal the steady progress of the finger print system, both in criminal and civil practice. More and more is the essential value and importance of this great discovery becoming the theme of writers, sociologists and officials. Now is the time for the ambitious young man or woman to acquire a thorough knowledge of the art; now, before the profession becomes overcrowded and while a knowledge of finger print identification is yet rare. During the great war, for example,

the finger print bureau of the United States Army, at Washington, was hard put to secure a sufficient number of experts to handle the tremendous volume of records.

The finger print student has a large field before him. He may enter criminal work, government work or he may secure employment with banks, maternity hospitals or large industrial enterprises. And this varied and intensely interesting field is being constantly expanded as the science of finger print identification comes more and more to be recognized as the one infallible method of fixing forever the personality of the human being.

CHAPTER II

FINGER PRINT FUTURE

When Charles Dickens, the great novelist, began the study of shorthand in the first half of the nineteenth century, he entered a profession of sure income to the proficient. In his day shorthand writers were rare and necessary; hence their great remuneration. Shorthand is now a common accomplishment.

Finger print experts are as rare as were shorthand writers in Dicken's boyhood. Fifty years hence, finger print experts will be as common as stenographers, because the use of finger print identification in commerce, industry, banking and public affairs will be universal. Those who equip themselves conscientiously and determinedly to fill this demand will skim the cream of all the demand which there shortly will be for operators in finger print science.

With the finger print system in use to identify criminals, it merely establishes its usefulness as an unerring method of determining personality. If a finger print of a malefactor can be obtained, it is not only impossible for the guilty to escape

identification, but it absolutely prevents the punishment of a victim of circumstantial evidence. No two finger prints are alike.

This service was the probationary period of finger print science. Triumph after triumph, demonstration after demonstration, has carried the process out of the field of experiment into the realm of the known and assured. Therefore, the business and scientific world is looking to finger print identification as the witness for personality.

For instance, it is necessary to recognize an individual in a foreign country or in a distant city. His banker, his lawyer, the mayor of his city, or a public identification office may take and attest his finger prints. These will be forwarded to the place of visit. Upon arrival, he appears before the proper parties. Five minutes work determines that the man present is identically and absolutely the person whose arrival was advised beforehand. There is no possibiity of error. Identification is more certain than a series of photographs from cradle to present could afford, or than all the measurement systems could guarantee.

John Smith, finger-printed in Chicago, upon arrival in London or Paris to transact business for said John Smith, is known to be personally present if his finger print record has arrived. Letters of introduction and similar protections

are out of date; the finger print identification has barred them out.

In the case of letters of credit, John Smith affixes his finger prints. Alongside are placed the endorsing finger prints of the clerk or official who issues the credit. In the heart of India, John Smith wants identification to draw sums of money. On file is the attesting finger print of the official in the bank of issue. Smith presents his letter. Only a few moments are required to make the double identification. There is no doubt of forgery, impersonation or fraud. John Smith is identified.

When a check is issued, if the maker will imprint his thumb over the signature and the amount, there is no known process either to forge the signature or raise the amount.

For pension claims, when the certificate is issued, upon presentation of the document, the agent can witness the finger prints of the rightful holder. No impostor can draw money on that voucher and it will be impossible by fraud to continue the life of the certificate after the death of the beneficiary. Any government voucher may be safe-guarded by this simple process.

When one disposes of wealth by will, finger prints prevent the forgery of the document.

Probably one of the most important uses of finger prints is in the insurance business. False report of death and fictitious proof often have

mulcted the companies of vast sums. By a simple finger print identification of every policy holder made at the time of physical examination, impersonation is impossible. There are no two human beings with identical finger prints. With such protection, insurance policies would gain much security both for the companies and the individuals.

Business houses soon will finger-print their employes. Some banks are already availing themselves of this process. Its spread into all branches of commerce where personality is a part of important transactions is only a matter of brief time. This protection is not only to the employer but to the employe. Frequently it is just as important to determine the rights and individuality of a worker as it is to guard the millionaire against robbery. Finger prints do that.

How many tales of false personality are found in literature and the law? If every member of a family were finger-printed at the age of one year, or even earlier, and a record preserved, there would be no possibility of impostors appearing and usurping the places of children, sometimes kidnapped or sometimes lost by accident.

Had the finger prints of the famous Tichbourne family been part of the archives of the family, there never would have been the great Tichbourne case where impersonation was vigorously

defended throughout a long and expensive litigation without absolutely settling the matter in the end. Finger prints will prevent all such frauds. Also the reappearance of lost relatives will be upon a basis where imposture is utterly impossible. Registration of every child by finger print is just as easy as registration of birth.

Startling as are these improvements in human intercourse, they are only the opening vistas of the science. All the great territory of its general use lies beyond these boundary glimpses. Already the army and the navy have introduced finger print identification for every member of the public defense. It has worked no hardship on any person, yet already the annals are full of the benefits arising from its use.

Most people think of this science as some mysterious process by which criminals are detected. This is only a small part of its practical utility and is probably the most negligible. True, if a finger print of the fugitive is obtained, it is useless for him to change his identity upon capture. Comparison silences his lie.

While finger prints in the average mind are ruthless avengers of crime, few stop to think of their many merciful applications. While the accusing finger print will convict the actual criminal, it will also free the victim of circumstantial evidence. When the chain of suspicious circumstances wraps round the body of the innocent,

no matter how terribly the accusatory details may involve a suspect, if there be at the scene of crime a single print smeared in blood, slime, grease, sweat or otherwise, that suspect will go free if a competent finger print expert is at hand.

There is no bribing the similarity of finger prints. John Smith has one eternal mark and Henry Jones has another. Twins, in the identity of their finger records, are as different as Hottentots and Caucasians. There can be no dispute. Thousands of men and women go free of suspicion today because a finger print expert denied the deductions of trained investigators. It is not alone in the terror of vengeance for crime that finger prints loom large in the future of human affairs, but still more for their kindly protection and safe assurance of identity.

As society grows more complex the need of this science becomes apparent. Mastery of its technique will well reward those who seriously undertake its study.

CHAPTER III

MAKING AND READING FINGER PRINTS

TYPES

Finger prints, as known and used in the science of identification, are the impressions made by the inner surfaces of the nail joints of the thumb and fingers.

Preparatory to the study of finger prints it is necessary to know the manner of taking digital impressions and the tools or articles used in that art, these being shown in Figure 1.

ARTICLES NEEDED TO TAKE FINGER PRINTS

1. Tube of printer's ink.
2. Rubber roller one inch in diameter and three to five inches long.
3. Slab or block; six inches wide by ten or twelve inches long, covered with a thin sheet of tin or polished brass.
4. Table; four feet high, three and one-half feet long, and two feet wide.
5. Gasoline or benzine for cleaning tools.
6. Finger print frame for holding blanks securely in place on edge of table.

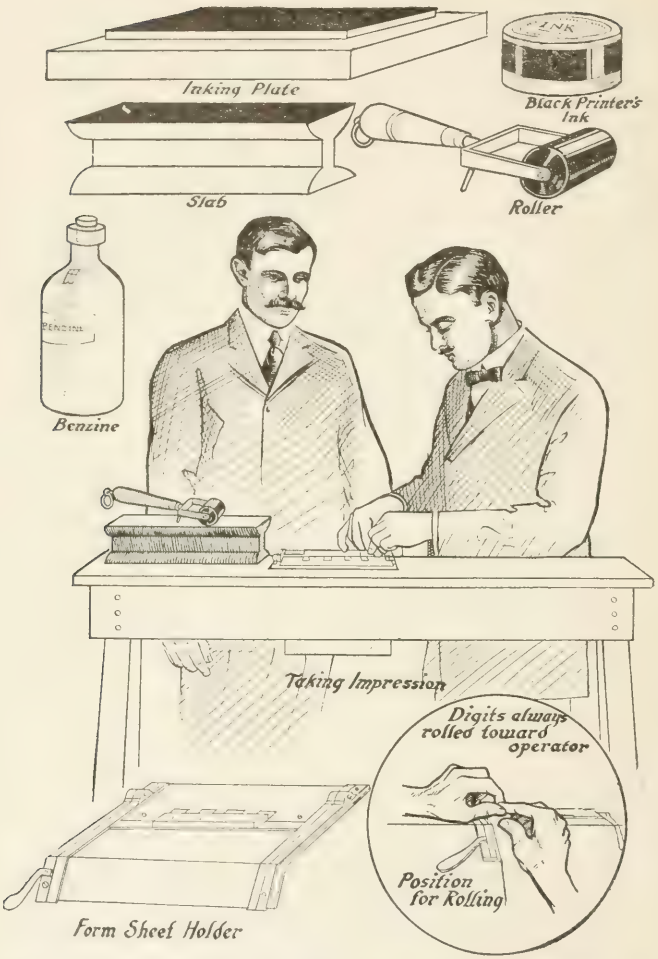


Figure 1.—The Articles Used in Taking Finger Prints and the Method Employed in Securing the Impressions.

HOW TO TAKE FINGER PRINTS

First thoroughly clean, then coat the surface of the slab with a thin layer of ink evenly distributed by the rubber roller. The subject is next placed on the operator's right and directly in front of the inked slab. The subject's fingers are inspected to see that they are free from dirt, grease, oil or foreign matter. When sure the hands are clean the operator takes the subject's right hand and inks the right thumb by placing the digit so that the right side of the nail is next the slab. The digit is rolled toward the operator until the left edge of the nail in its turn almost touches the slab. The inked digit is then placed upon the blank form or plain paper with the right side of the nail next the paper. It is then rolled towards the operator in the same manner as when inking. The operator then inks and prints separately, the index finger, the middle finger, the ring finger, and the little finger of the right hand. For the left hand the operator repeats the process without changing position.

Impressions thus obtained are known as "rolled impressions" and are the most desirable as they very clearly show upon the sheet every ridge and detail of the impression. This greatly aids those who classify prints, search files or make comparisons.

Full Hand Impressions.—After having thus

Figure 2.—An Ulnar "Outer" Loop Having Twenty-four Ridges on the Line of Count. A—Lower Type Line. B—Line of Count, the Shortest Possible Line from Core to Delta. C—Core, Apex of Inside Loop. D—Delta, Most Central Point Between Type Lines. E—Upper Type Line.

made the rolled impressions, the digits of each hand are reproduced as they lie naturally, and impressed in the space provided at the bottom of the finger print form. First the right hand and then the left is impressed. In making these simultaneous impressions, the four fingers should be inked at once by laying them evenly and in a natural position upon the ink slab. They are then impressed upon the form blank by gentle direct pressure; making a plain impression, that is, a single contact with the sheet and without rolling the fingers. Then ink the thumb and impress it in its place beside the digits. Repeat this process for the left hand.

Impressions thus made are known as "plain impressions." They check the rolled impressions, eliminating any possible error on the part of the operator, who may be interrupted or confused while taking the rolled prints and improperly record one digit in the space reserved for another.

After using, all ink should be removed from the slab and roller with benzine or gasoline.

Learn Finger Print Fundamentals First.—If one would master this subject he should be advised to study well the first details. If a language were to be learned, the first concern would be the alphabet. Once we had mastered the letters we might easily group them into words and with still more ease form words into sentences.

Figure 3.—A Whorl Pattern "Meet" Having But One Line Passing Inside the Right Point of Delta. A—Lower Type Line. B—Delta. C—Upper Type Line. D—Upper Type Line. E—Delta. F—Lower Type Line.

By the same natural procedure the finger print system may be readily mastered.

RIDGES AND DEPRESSIONS

Finger prints are composed of black and white lines as shown in Figure 4. The student will be entirely concerned with ridges. These are always

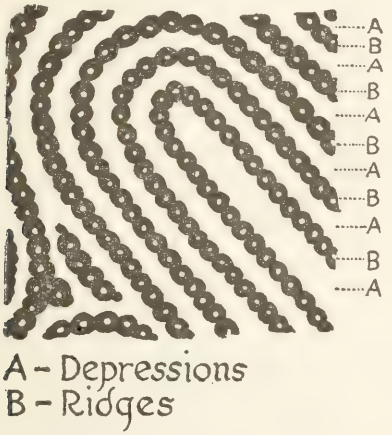


Figure 4.—The Ridges and Depressions Composing a Finger Print.

represented by the impressed black lines. The white spaces between these are not significant and therefore are not considered. They, however, are known as depressions.

Fixed or Determining Points.— Certain fixed or determining points appear in all types except the plain and tented arch. Such points enable the

student to ascertain the exact nature of the pattern he is studying. They are known as the core, the delta, and the type line and are defined as follows:

Figure 5.—The Core, Indicated by the Dot at the Apex of the Inside Ridge of This Loop.

Core.— As the name signifies, this is the center of the apex of the inside ridge of a loop, or the center of the innermost coil of a whorl. Indicated in Figure 5.

Figure 6.—Type Lines, Indicated by the Blackened Curves Slightly Toward the Right from the Center of the Illustration.

Type Lines.— These are parallel lines or curves which, entering the print near the lower corner or corners, flow upward and inward to a point near the type formation, where they diverge and form the delta location. Indicated in Figure 6.

Delta.— This is a dot, bifurcation, broken line or short line situated between the points of a divergence of the type lines. Indicated in Figure 7.

Figure 7.—The Delta, Indicated by the Position Blackened at the Center of the Illustration.

TYPES OR PATTERNS

In finger prints there are but ten distinct types or patterns. These ten vary in formation but easily classify under the following heads:

1. Plain Arch.
2. Tented Arch.
3. Exceptional Arch.
4. Radial Loop.
5. Ulnar Loop.
6. Whorl.
7. Central Pocket Loop.
8. Twin Loop.
9. Lateral Pocket Loop.
10. Accidental.

Study each type separately and observe the characteristics and general formation.

1. *Plain Arch.*— In this type the ridges flow

from one side of the impression to the other without recurving, slightly raising in their course midway, which gives the appearance of an arch. Shown in Figure 8.

2. *Tented Arch.*— In this type the ridges flow like a sharp tipped wave from one side of the impression to the other, abruptly rising to a point or perpendicular position near the center. Shown in Figure 9.

Figures 8 and 9.—The Plain Arch Shown at the Left and the Tented Arch Shown at the Right.

3. *Exceptional Arch.*— This resembles the plain arch, but has one recurving ridge without the delta or it may show the delta and no recurving ridge. Shown in Figure 10.

Loops are types having at least one ridge which recurves and passing between the core and the delta makes exit on the same side. The direction in which the ridges flow determines the character of the loop which is either radial or ulnar.

4. *Radial Loop.*— This is a loop whose ridges recurve and form a downward slope towards the thumb. Shown in Figure 11.

5. *Ulnar Loop.*— This is a loop whose ridges recurve and form a downward slope towards the little finger. Shown in Figure 12.

Figures 10 and 11.—The Exceptional Arch Shown at the Left and the Radial Loop Shown at the Right.

6. *Whorl.*— This type shows two deltas. Although varying greatly in formation it generally appears either as an oval or circular spiral. Shown in Figure 13.

7. *Central Pocket Loop.*— This type classifies as a whorl but is distinguished by having at least one line which recurves at right angles across the axis of the loop. Shown in Figure 14.

8. *Twin Loop.*— This type classifies as a whorl but is formed by two distinct loops appearing in one impression. The exits of the ridges sur-

rounding the cores of this compound type are separated by an interposed delta. Shown in Figure 15.

Figures 12 and 13.—The Ulnar Loop Shown at the Left and the Whorl Shown at the Right.

Figures 14 and 15.—The Central Pocket Loop Shown at the Left and the Twin Loop Shown at the Right.

9. *Lateral Pocket Loop.*— This type classifies as a whorl, but it is double-cored with two distinct loops. The ridges surrounding the cores

have their exits on the same side of the delta. This type has only one difference from the twin loop; namely, the ridges around the cores of the lateral pocket loop make their exit on the same side of the delta, while those of the twin loop are separated by the delta. Shown in Figure 16.

10. *Accidental.*— This last pattern is not strictly a type. It is rather a complex of two or more types appearing in a single impression.

Figures 16 and 17.—The Lateral Pocket Loop Shown at the Left and the Accidental Shown at the Right.

They are sometimes fully and sometimes partially formed. Shown in Figure 17.

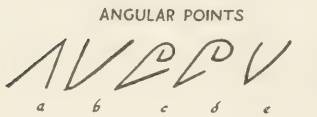
TYPE DISTRIBUTION

Types are sub-divided by ridge counting and ridge tracing. Ridge counting applies to the loop type, while ridge tracing applies to the whorl type.

Method of Ridge Counting.— Ridge counting

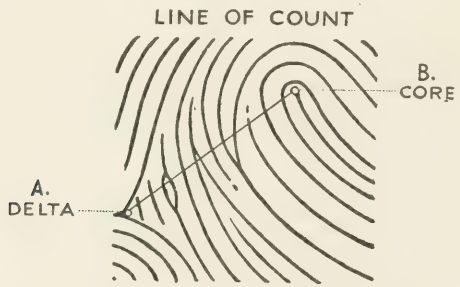
RECURVE

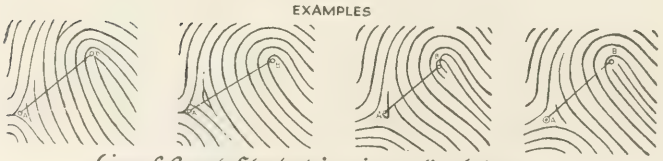
A curve is a bending without angles. A recurve is a line or ridge gradually turning back. The turn is circular or rounding.



ANGULAR POINT

Angular point: meeting of two lines or ridges giving angular or pointed appearance. These points have no value. They are given here merely to illustrate the difference between the recurve and the angular point.





Line of Count: Shortest imaginary line between core & delta.

TYPE LINES

Type Lines are characteristic ridge formations used to locate the delta. The first lines outside of the delta, giving way to the type formation.

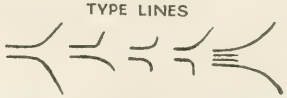


Figure 18.—Showing the Line of Count, the Imaginary Line Between Core and Delta; Also Examples of Recurves, Angular Points and Type Lines.

is done by placing a pointer on the core and then counting along an imaginary line to the delta or from the delta to the core as shown in Figure 18. This counting decides whether the loop is to be classed as an inner or outer.

Figure 19.—An Inner Loop with Eight Ridge Counts.

Millions of counts have shown that the number of lines on fingers and thumbs, while never regular or certain, group themselves in general

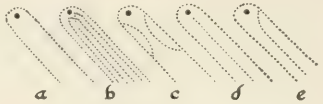
Figure 20.—An Outer Loop with Twelve Ridge Counts.

classes. For instance on the index finger the balance line will be the ninth line. Putting it otherwise; there are as many index fingers where the lines from the core to the delta count nine as

CORE

The CORE is the apex of the inside loop.

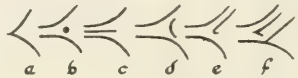
Cores



DELTA

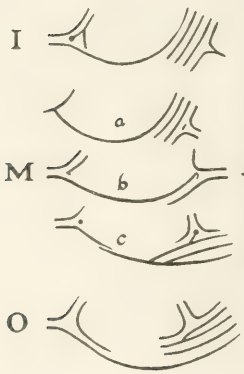
The DELTA is the most central point between the type lines.

Deltas



WHORL

INNER, MEET & OUTER



INNER

If the type line passes inside the right point of delta with THREE or more ridges intervening, the pattern is called an INNER whorl. Symbol "I."

MEET

If the type line passes inside the right point of delta with not more than TWO ridges, as in "a".

If the type line actually MEETS the right point of delta, as in b;

or passes OUTSIDE the right point of delta with not more than TWO ridges intervening, as in c. The symbol for the above (a, b, c) is "M."

OUTER

If the type line passes OUTSIDE the right point of delta with THREE or more ridges, the pattern then becomes an OUTSIDE whorl. Sybol "O."

EXAMPLES OF WHORL FORMATION

Figure 21.—Showing Examples of Cores, of Deltas, of Inner and Meet and Outer Whorls, and Examples of Whorl Formation.

instances where they exceed nine. On middle fingers the balance comes on line ten. Hence there are two loop classes.

Loop Sub-division.— A loop in either index

Figure 22.—An Inner Whorl.

finger is classed as an inner when the ridges counted do not exceed nine. A loop in either middle finger is classed as an inner when the ridges counted do not exceed ten.

Figure 23.—A Meet Whorl.

A loop in either index finger is classed as an outer loop when there are ten or more ridges. A loop in either middle finger is classed as an outer loop when there are eleven or more ridges.

Inner and outer loops are shown in Figures 19 and 20.

Method of Ridge Tracing.— Place the pointer on the left delta and follow it towards the right delta until the point actually runs into or is at an angle with the right delta. If the traced line breaks, the pointer is dropped to the next lower line and the tracing continued until the pointer either meets or is at angles with the right delta.

Figure 24.—An Outer Whorl.

If the left delta is formed in any other way than bifurcation, as by a dot or broken line, the pointer is placed on the lower type line and the tracing is as above.

Whorl Sub-divisions.— A whorl is classed as inner when the traced line at its stopping point is inside the right delta and (found as above directed) has between it and the right delta three or more ridges.

The meet whorl occurs when the traced line actually runs into or comes inside or outside the right delta with but two intervening ridges.

Outer whorls are formed when the traced line comes outside the right delta with three or more ridges intervening.

Cores, deltas and whorls are shown in Figures 21 to 24.

CARE IN TAKING PRINTS

Finger print identification requires one hundred per cent efficiency in all details. This point cannot be too strongly stressed. In order to do the work for which they were intended, the impressions must be placed correctly on the sheet and they must show up clearly and distinctly without blurs or blots of any kind. It is a lamentable fact that in some institutions officials are remarkably careless in taking finger impressions, no doubt not realizing that results obtained from these sheets depend upon the accuracy of their efforts.

With the rolled and plain impressions correctly taken, the next item of importance is absolute accuracy of classification. This is only possible when strict attention is paid to the various patterns and pairs as to their numerical values; then to the matter of securing a perfect ridge count or tracing. The first thing to consider is the selection, out of a multitude of diverse core and delta formations, of the unquestionable core or delta of the pattern to be classified. These located, the next step is to count the ridges, fol-

lowing the wire under the glass along the line of count. This line of count must be accurate to the tiniest detail or the ridge count is impossible. The importance of the correctness of the ridge count will be understood when one realizes how much depends upon the question of inners and outers in whorls and loops, and upon the little finger (final) classification.

To sum up in a few words; the impressions must be properly placed and taken in order to insure exact classification. The classification must be entirely correct so that the sheets may be found in their right place in the files where they are accessible for purposes of identification. All these processes are dovetailed together and are interdependent. Let the student strive for one hundred per cent efficiency in his work; that alone will produce the accuracy required for actual results.

SYMBOLS USED IN FINGER PRINTS

All types are indicated by symbols which are merely abbreviations of the types. These symbols are shown in Figures 25 and 26.

1. For plain or exceptional arch in either index finger, the capital *A;* if in digits other than the index finger the small *a.* See Figures 27 and 29.

2. For tented arch, in the index fingers, capi-

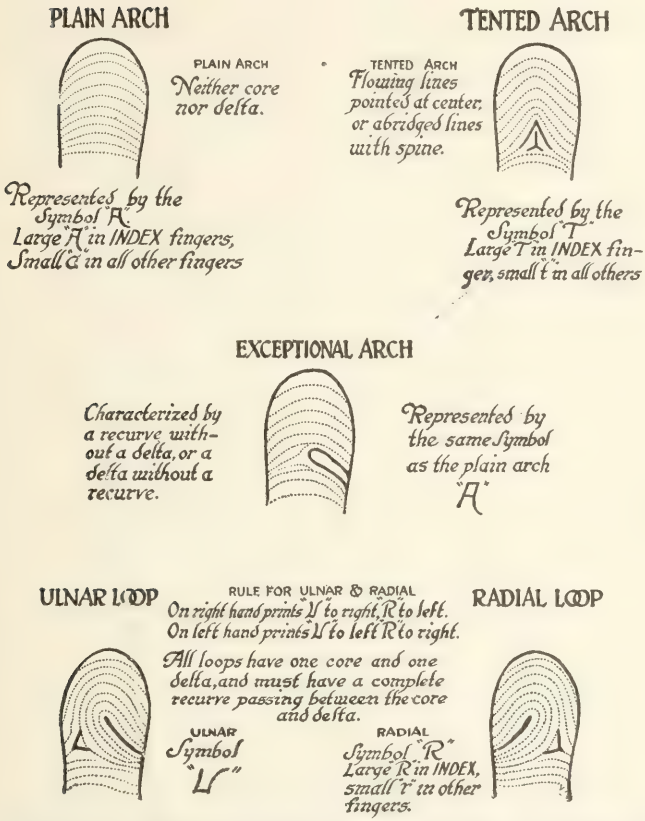


Figure 25.—Symbols Used in Finger Prints. Showing the Application of the Letter Symbols Which Indicate the Plain, the Tented and the Exceptional Arch and Those Indicating the Ulnar and the Radial Loop.

tal *T;* if in digits other than the index finger the small *t.* See Figure 28.

3. For the radial loop a bar /, slanting in the same direction as the ridges flow toward the thumb. See Figure 30.

4. For the ulnar loop a bar \, slanting in the same direction as the ridges flow toward the little finger. See Figure 30.

5. For the whorl, central pocket loop, twin loop, lateral pocket loop and the accidental, the capital *W* is used. See Figure 31 to 37.

6. For an inner loop the capital *I* is used.

7. For an outer loop the capital *O* is used.

8. For an inner whorl the capital *I* is used.

9. For a meet whorl the capital *M* is used.

10. For the outer whorl the capital *O* is used.

Type	Symbol
Arch	*A* and *a*
Tented Arch	*T* and *t*
Loop Radial	/
Loop Ulnar	\
Whorl	*W*
Central Pocket Loop	*W*
Twin Loop	*W*
Lateral Pocket Loop	*W*
Accidental	*W*
Loop Inner	*I*
Loop Outer	*O*
Whorl Inner	*I*

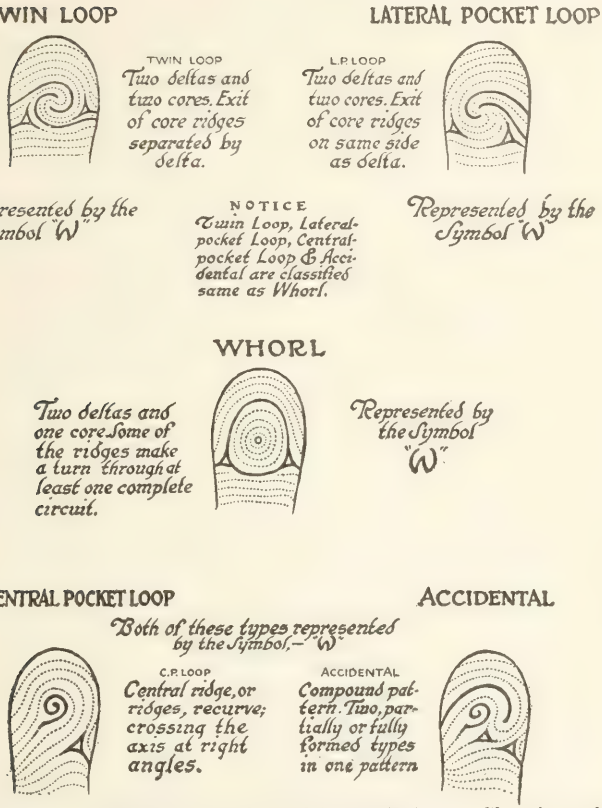


Figure 26.—Symbols Used in Finger Prints. Showing the Application of the Letter Symbols Which Indicate the Twin, the Lateral Pocket and the Central Pocket Loops, Also Those for the Whorl and the Accidental.

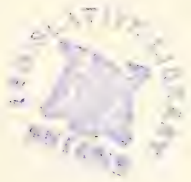
Whorl Meet ..... *M*
Whorl Outer ..... *O*

Recapitulated
A and *a*—*T* and *t*—/—\—*W*—*I*—*M*—*O*

Throughout the above explanation as few words as possible have been used. Illustrations with brief definitions have been relied upon. Analysis of types can be given only in a general way because of the infinite variation. Attempt has been made here to give the fundamentals of this science of identification. Use of this art will soon be adopted by many more departments of life than the police and military. Brief as are these comments, close study of the types and of the definitions will enable an accurate placing or cataloging of any pattern under the proper heading. Opportunity has been thus afforded to know and recognize the ten basic types and the variations of the whorls and loops. Methods of tracing and counting of ridges have been outlined. Study and practice of these condensed statements will enable the student to appreciate and profit by the succeeding chapters.

In this introduction to finger prints you have considered briefly but accurately each topic. It has been shown; first, that finger prints are the impressions of the inner surface of the nail joints; second, that such impressions consist of black and white lines; third, that the black lines

represent what is termed in finger prints, "the ridge"; fourth, that the variations or curvatures of these ridges form patterns; fifth, that by the aid of fixed points, all patterns classify under ten general type headings; and sixth, that when patterns accumulate under one type heading they may be distributed by the method of ridge counting and ridge tracing.



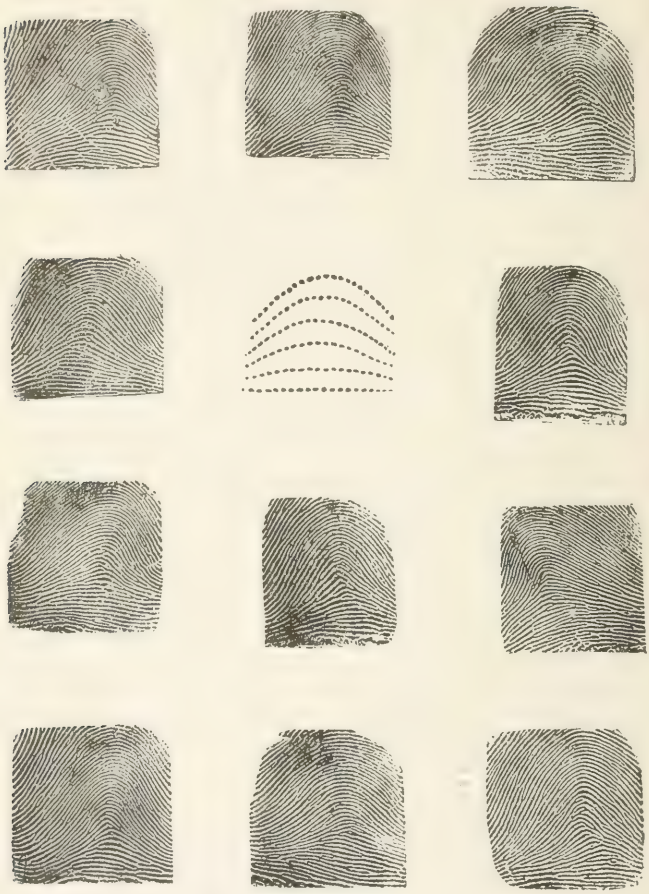


Figure 27.—Examples of Plain Arches.

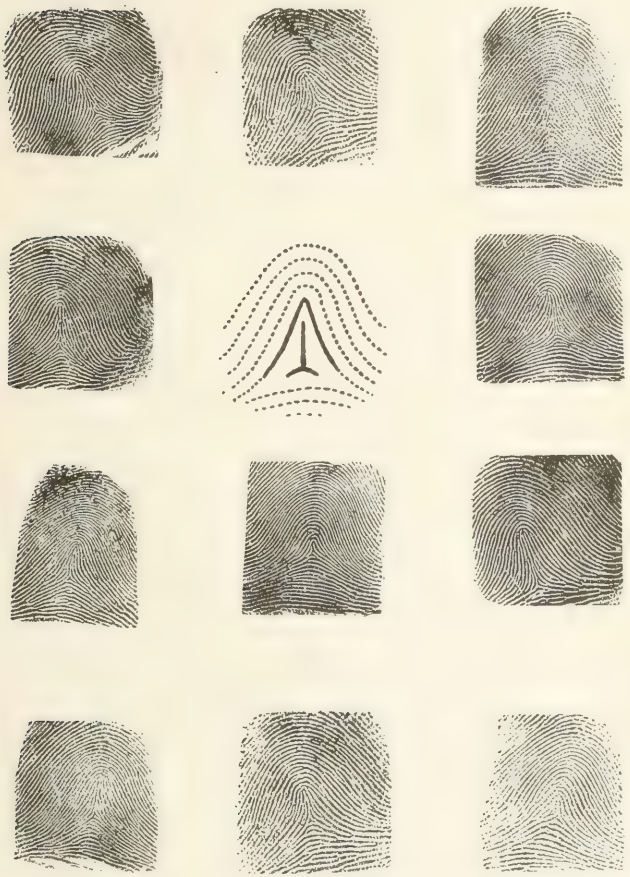


Figure 28.—Examples of Tented Arches.

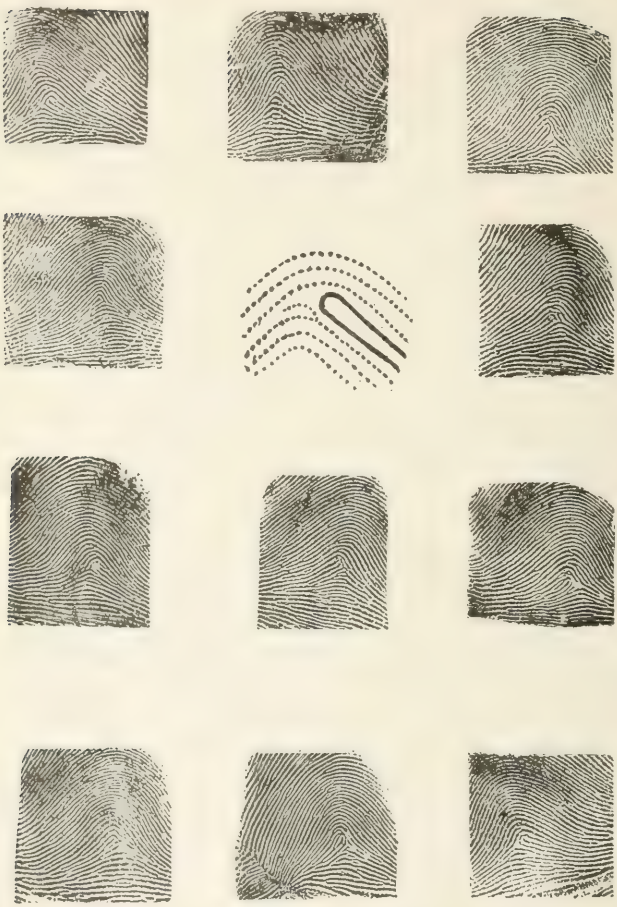


Figure 29.—Examples of Exceptional Arches.

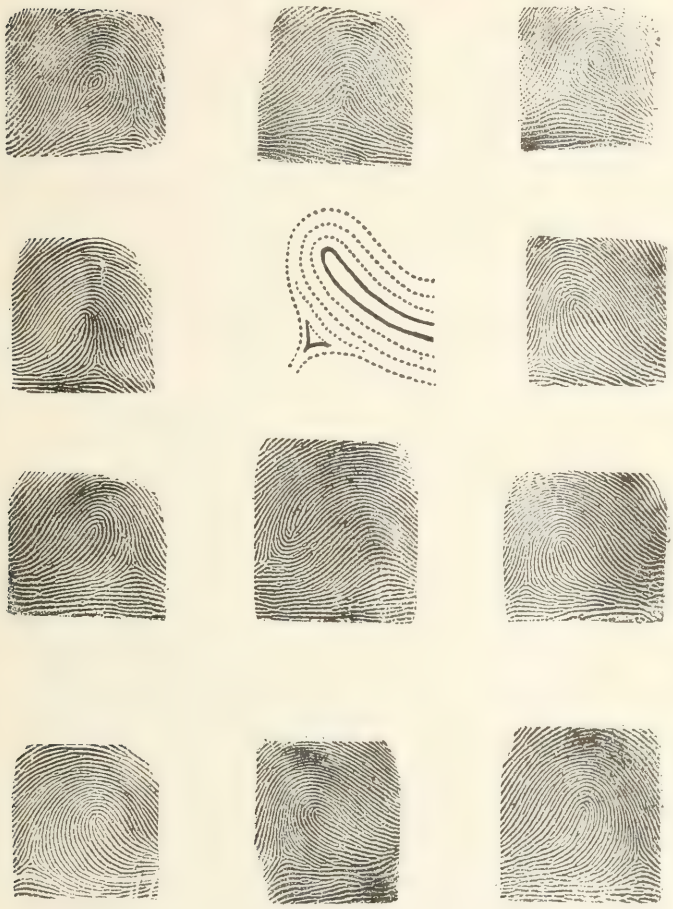


Figure 30.—Examples of Ulnar and Radial Loops.

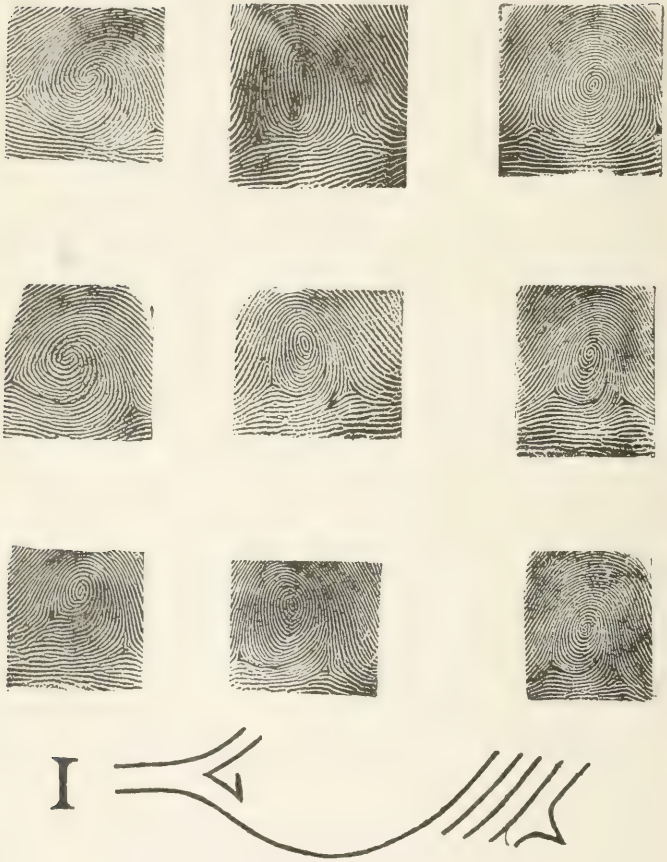


Figure 31.—Examples of Inner Whorls.

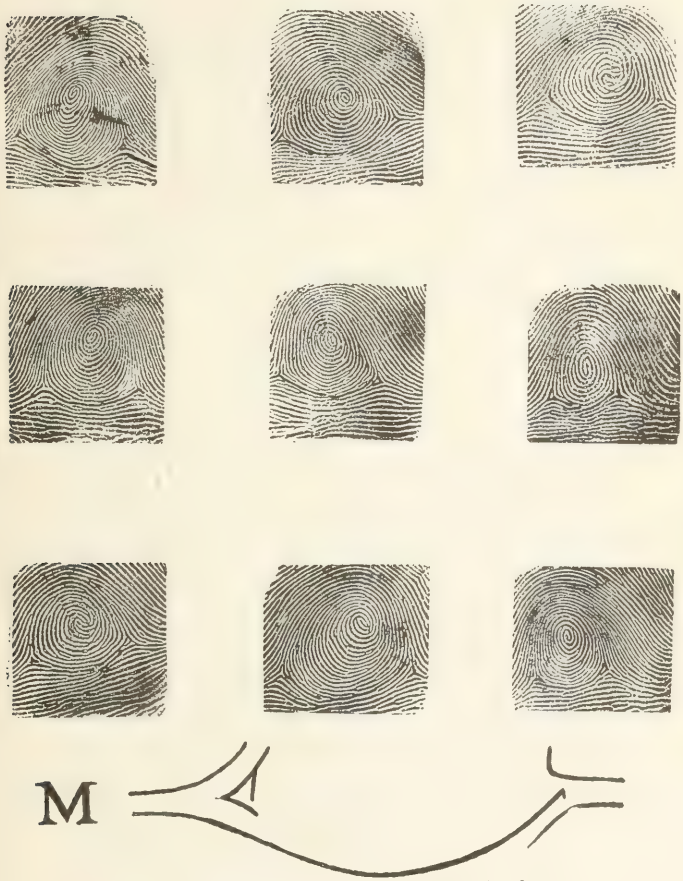


Figure 32.—Examples of Meet Whorls.

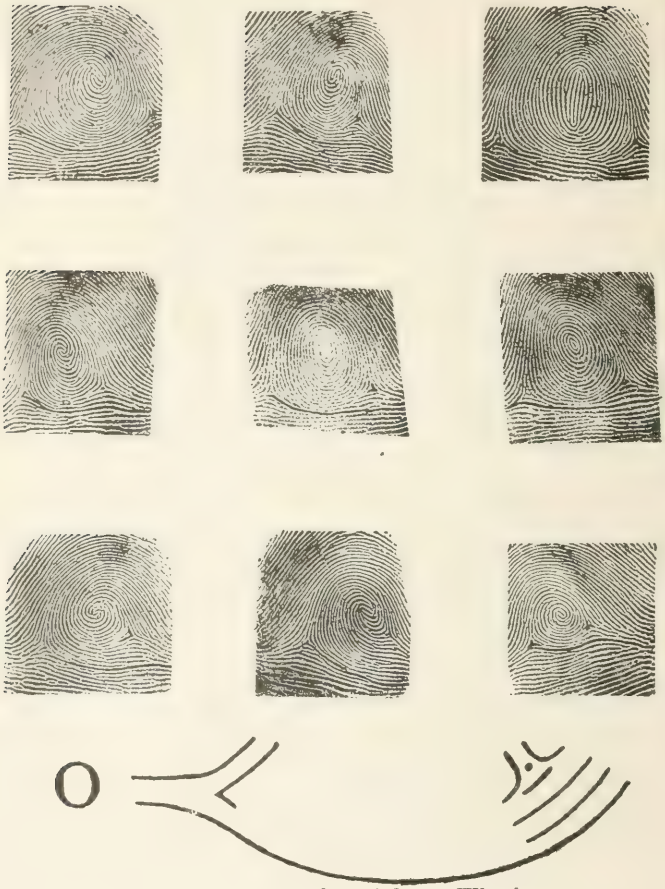


Figure 33.—Examples of Outer Whorls.

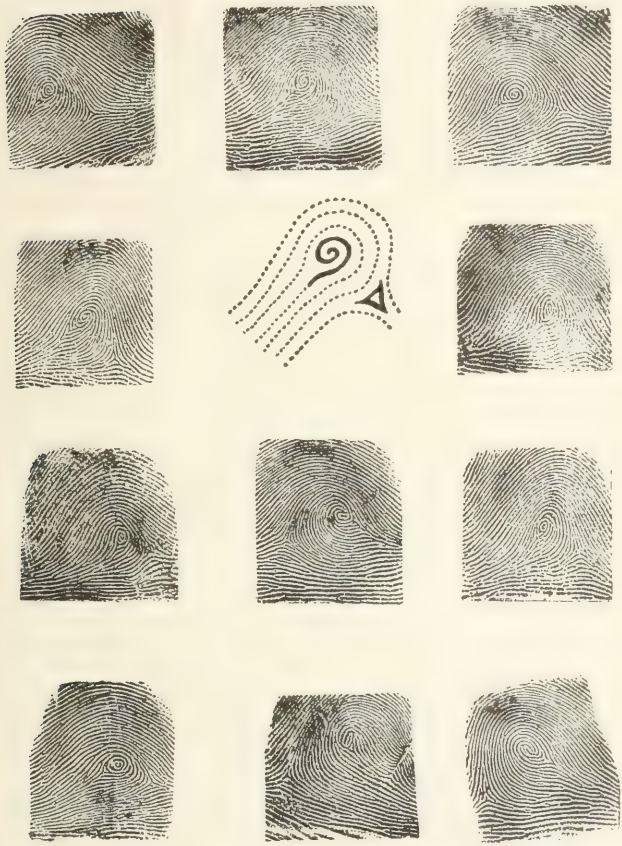


Figure 34.—Examples of Central Pocket Loops.

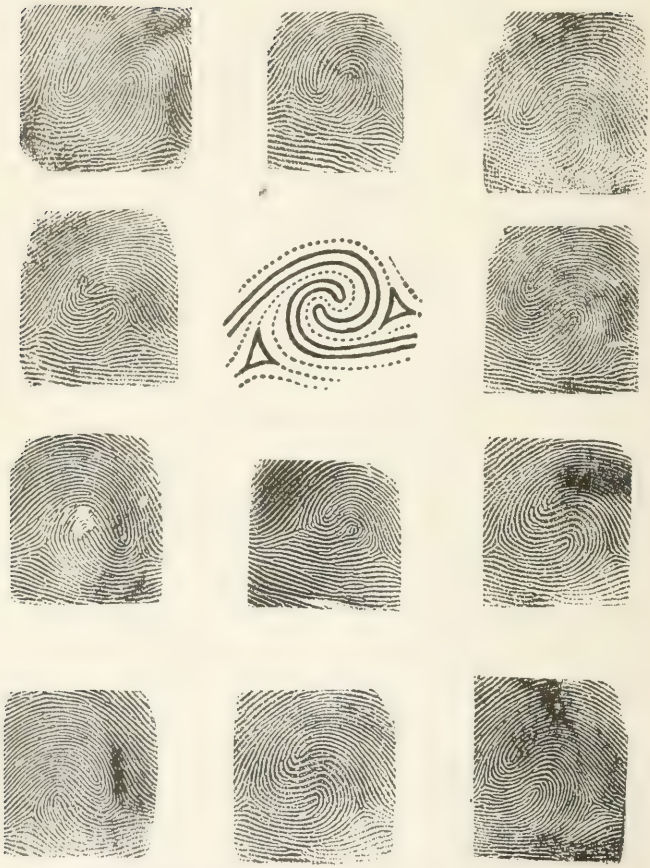


Figure 35.—Examples of Twin or Twinned Loops.

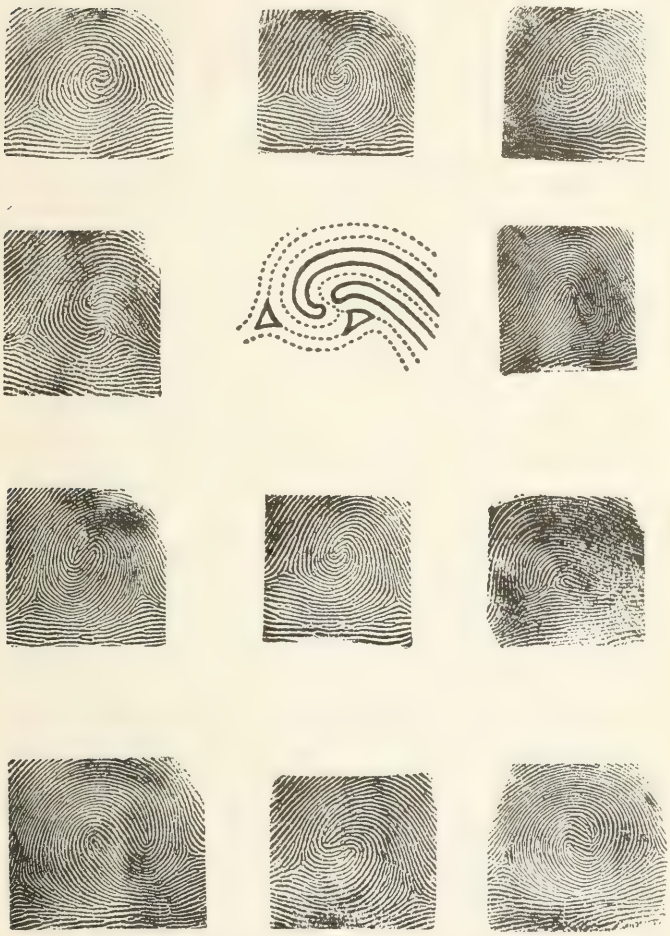


Figure 36.—Examples of Lateral Pocket Loops.

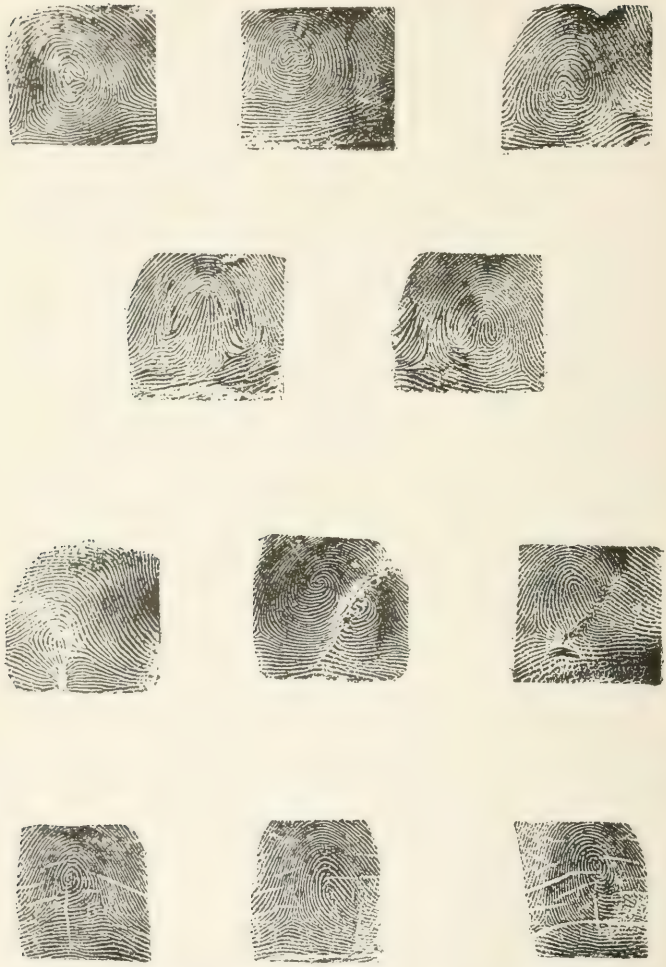


Figure 37.—Upper Row—Accidentals. Second Row—Complex Types. Third Row—Scars. Lower Row—Creases.

CHAPTER IV

CLASSIFICATION OF FINGER PRINTS

Grouping types in sets or dealing with them collectively naturally follows an understanding of them singly. Every set of prints consists of impressions of the digits of both the right and the left hands. These are arranged in groups and pairs under the general head of classification. The equipment used is shown in Figure 38, and the form in Figure 39.

Briefly, classification is the method of obtaining a formula for a set of prints. Study of the following forms will make this method familiar; but the forms given are only examples of the infinite variation of the combinations possible. These formulas designate the order and place of any set in the files, just as an index directs to a subject in a book. All formulas are composed of numbers and letters and are subdivided as follows:

First—Primary classification.
Second—Sub-classification.
Third—Second sub-classification.
Fourth—Final classification.

Figure 38.—Finger Print Classification Equipment and Its Use. A—Common Lead Pencil. B—Enlarging Glass. C—Cabinet. D—How to Start the Work. Pointer at Bottom.

In the following pages these divisions are defined and analyzed separately.

Primary Classification.— Primary classification is the index to the filing cabinet and is always expressed in numbers.

Sub-classification.— Sub-classification is expressed by lettered symbols representing the type of patterns in the index fingers. It is the second division of the formula and is used to distribute or to separate sets of prints having the same primary classification.

Second Sub-classification.— Second sub-classification results from ridge counting and ridge tracing of the index and middle fingers and forms the third division of the formula. It is represented by a combination of the letters *I, M* or *O,* and is used to distribute or separate sets of prints having the same primary and sub-classifications.

Final Classification.— Final classification is the ridge count of the little finger expressed in numbers and is used to distribute or sort out sets of prints having the same primary, the same sub and the same second sub-classification.

Divisions Combined.— When these four divisions are combined and applied to a set of prints they constitute what is known as the formula. When the set of prints is represented, as for example, wholly by ulnar loops of the inner type, as:

Right Hand $\frac{U|U|U|U|U}{}$
Left Hand $\frac{U|U|U|U|U}{}$

it would give the following complete formula:

Primary	Sub-class	Second Sub-class	Final
1	U	II	12
1	U	II	

which reads *1-U-II-12* over *1-U-II*.

Grouping, pairing and marking in sets follow the understanding of the various symbols. How to produce a formula which will accurately describe a hand so that it may be referred to instantly and identified out of millions of finger prints is the logical study after learning the fundamentals of the system. Such identification is as simple as finding a name in a city directory. Study carefully the analyses given here and this system will be found simple in construction as well as an interesting topic.

HOW TO PRODUCE FORMULAS

All types of patterns distribute themselves into two groups, the non-numerical and the numerical.

In the non-numerical group are embraced those patterns which when considered individually have no numerical value, but when taken collectively in sets are arbitrarily assigned the value of 1. This group includes five types:

1—*Plain Arch*
2—*Tented Arch*
3—*Exceptional Arch*
4—*Radial Loop*
5—*Ulnar Loop*

In the numerical group are embraced those patterns having a numerical value. These values are determined by their locations in sets. This group includes:

1—*Whorl*
2—*Central Pocket Loop*
3—*Twin Loop*
4—*Lateral Pocket Loop*
5—*Accidental*

With this general arrangement of all types into groups the study hereafter will be confined to individual sets of impressions which show on the form sheet and will be taken up in the following order:

Right hand digits: (1) Thumb, (2) Index finger, (3) Middle finger, (4) Ring finger, (5) Little finger.

Directly beneath these right hand digits are

Name _____

Aliases _____ Classification No. _____

RIGHT HAND.

1.—Right Thumb.	2.—R. Fore Finger.	3.—R. Middle Finger.	4.—R. Third Finger.	5.—R. Little Finger.

Impressions to be taken so that the flexure of the last joint shall be immediately above the *black* line. If the impression of any digit is defective, a second print may be taken in the vacant space above it.

When a finger is missing or so injured that the impression can not be obtained, or is deformed and yields a bad print, the fact should be noted under *"Remarks incident to damaged and amputated fingers."*

LEFT HAND.

6.—Left Thumb.	7.—L. Fore Finger.	8.—L. Middle Finger.	9.—L. Third Finger.	10.—L. Little Finger

LEFT HAND. Plain impressions (not rolled) of thumb and four fingers	RIGHT HAND. Plain impressions (not rolled) of thumb and four fingers.

Impressions taken by _____ Date _____

Classified by _____

Date _____ _____

Prisoner's Signature.

Figure 39.—The Finger Print Sheet.

found the left hand digits in order: (6) Thumb, (7) Index finger, (8) Middle finger, (9) Ring finger, (10) Little finger.

This numbering never varies in the form sheet. When the operator sees 6 he knows it represents the left thumb and nothing else. When he sees 1 it represents only the right thumb, when he sees 10 it is the left little finger, etc. To illustrate:

	1	*2*	*3*	*4*	*5*
Right Hand	*R. T.*	*R. I.*	*R. M.*	*R. R.*	*R. L.*
	6	*7*	*8*	*9*	*10*
Left Hand	*L. T.*	*L. I.*	*L. M.*	*L. R.*	*L. L.*

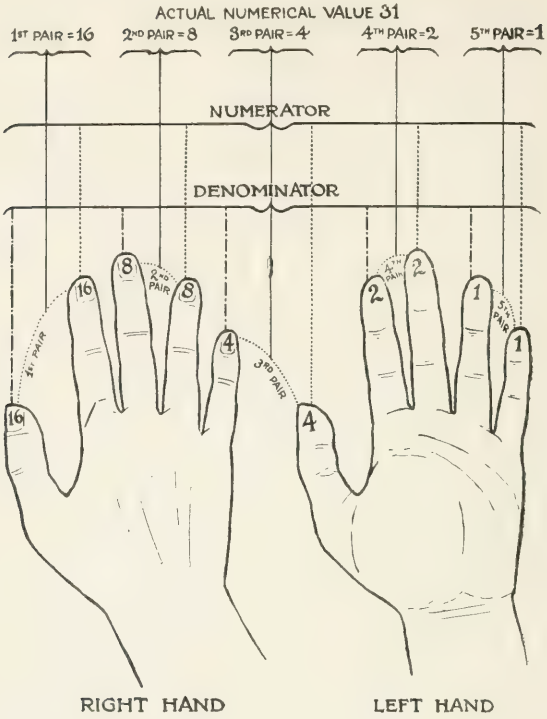
How Digits Are Paired.— In classifying a set of prints every pattern is designated by a symbol representing its type. These symbols are placed beneath the patterns on the form chart. After properly marking the impression, the digits of both hands (ten in number) are separated into pairs. These pairs are shown in Figure 40.

Pair 1—(1) Right thumb and (2) right index fingers.

Pair 2—(3) Right middle and (4) right ring fingers.

Pair 3—(5) Right little finger and (6) left thumb.

Pair 4—(7) Left index and (8) left middle fingers.



NON NUMERICAL

PLAIN ARCH	TENTED ARCH	EXCEPTIONAL ARCH	RADIAL LOOP	ULNAR LOOP

NUMERICAL

WHORL	CENTRAL POCKET LOOP	TWIN LOOP	LATERAL POCKET LOOP	ACCIDENTAL

Figure 40.—Pairing the Digits and the Values Used for Numerators and Denominators.

Pair 5—(9) Left ring and (10) left little fingers.

Value of Pairs.— When a numerical pattern appears in either digit of the above pairs, it is assigned the following values:

In either digit of pair 1.....16
In either digit of pair 2..... 8
In either digit of pair 3..... 4
In either digit of pair 4..... 2
In either digit of pair 5..... 1

Numerators and Denominators.— Symbols placed in the top line of a formula are called numerators; those in the second or bottom line are known as denominators.

Numerators for the primary or main classification are formed by the addition of the even digits; or the second, fourth, sixth, eighth and tenth digits of the several pairs, plus 1.

Denominators are formed by adding the odd digits, or the first, third, fifth, seventh and ninth digits of the several pairs, plus 1.

After the use of 1 is explained, rules for the sub, second-sub, and final classification will be given.

Addition of 1 Explained.— Sets formed from the arch and loop patterns have no numeral, main or primary classification. To aid in placing them in the file, the numeral value of 1 is arbitrarily fixed for both the numerator and denominator,

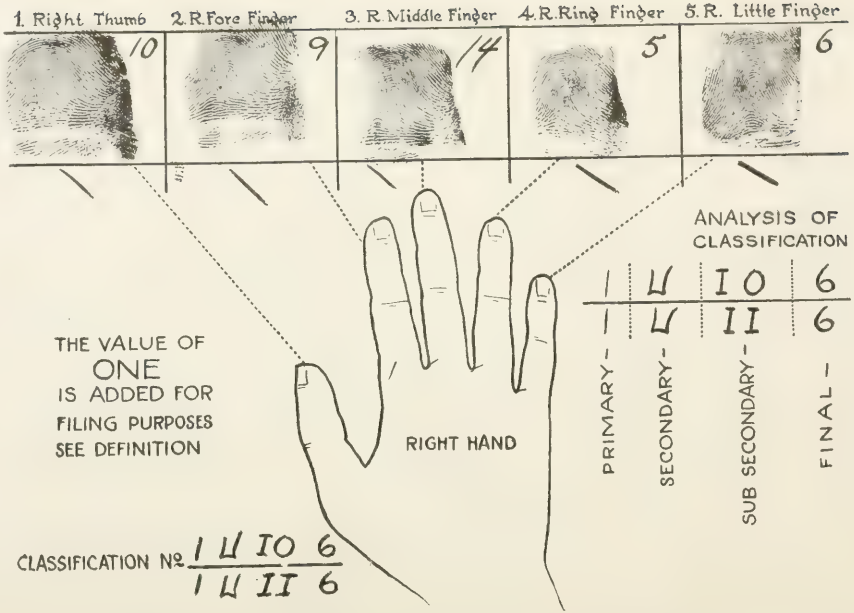


Figure 41.—Producing the Formula for the Right Hand.

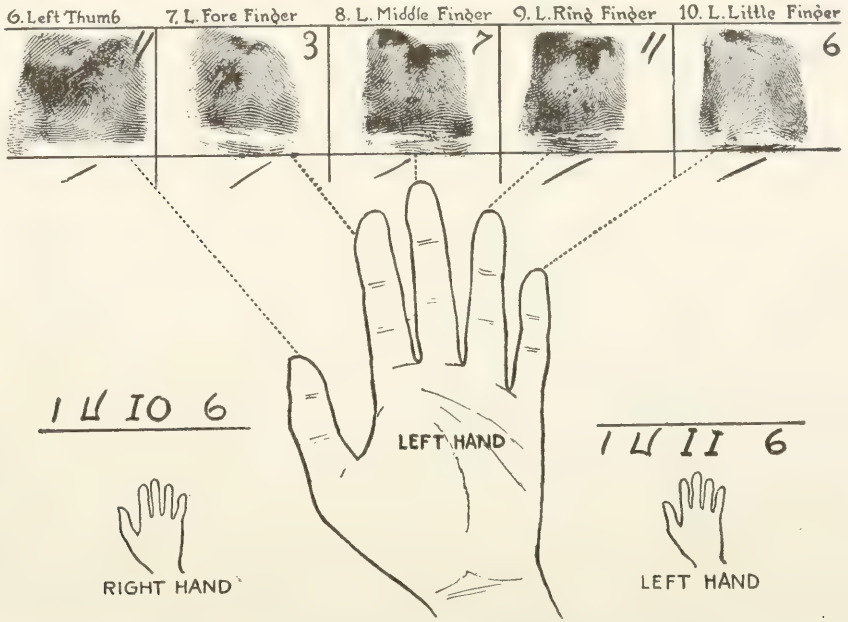


Figure 42.—Producing the Formula for the Left Hand.

written as $\frac{1}{1}$ and read "1 over 1." This value given to one set of digits necessarily adds the same value to each set, resulting in a combination of numbers from 1 to 32, which affords 1,024 variations of the main classification. "One over one," $\frac{1}{1}$, is the smallest classification and "32 over 32," $\frac{32}{32}$, is the greatest.

Illustrations of these numbered combinations are as follows:

$\frac{1|2|3|4|5|6|7|8|9|10|11|12}{1|1|1|1|1|1|1|1|1|\ 1\ |\ 1\ |\ 1}$ etc. up to $\frac{32}{1}$ or

$\frac{1|2|3|4|5|6|7|8|9|10|11|12}{2|2|2|2|2|2|2|2|2|\ 2\ |\ 2\ |\ 2}$ etc. up to $\frac{32}{2}$ or

$\frac{1|2|3|4|5|6|7|8|9|10|11|12}{3|3|3|3|3|3|3|3|3|\ 3\ |\ 3\ |\ 3}$ etc. up to $\frac{32}{3}$ and so on up to $\frac{32}{32}$

METHOD OF FORMING PRIMARY CLASSIFICATION

Explanation and illustration of the primary classification and the pairs involved appear in Figures 41 and 42 and in the following:

$$\begin{array}{l} \\ \text{Right Hand} \\ \text{Left Hand} \end{array} \begin{array}{c} \text{Pr. 1} \quad \text{Pr. 2} \\ W \mid \diagdown \mid \diagdown \mid W \mid \diagdown \\ \hline \diagup \mid \diagup \mid W \mid \diagup \mid \diagup \\ \text{Pr. 3} \quad \text{Pr. 4} \quad \text{Pr. 5} \end{array} = \frac{11}{17}$$

In this assumed or imaginary set of impressions the primary classification would be $\frac{11}{17}$.

There is but one odd impression having a numerical value. This appears in pair 1. Since it appears in the first pair its numerical value is 16; being an odd digit or the first pattern in the pair it represents the denominator. Thus $16 + 1 = 17$, the denominator of the primary classification. In the foregoing combination there are two even impressions, one in pair 2 and one in pair 4, each having a numerical value. Since they appear in the second and fourth pairs their respective values are; pair $2 = 8$, pair $4 = 2$. Being even impressions the sum of their values plus 1 represents the numerator. Thus the addition is $8 + 2 + 1 = 11$ for the numerator of the primary classification, which is expressed as $\frac{11}{17}$ and reads "11 over 17." In the following examples the same method is applied without detailed explanation.

Having obtained the primary or main classification, the sub-classification is the next concern. Here as well as in the second-sub and final classifications, the right hand impressions will represent the numerator and the left hand impressions will denote the denominator. Attention to this change is necessary in order to secure an accurate sub-classification.

SUB-CLASSIFICATION

Sub-classification is a combination of the letters *A*, *T*, *R*, *U* and *W*, which are written in the formula immediately on the right of the primary classification. These letters merely represent the style of the pattern in the index finger. For example: should the following pattern occur in a set of prints:

Right Hand $W|\diagdown|\diagdown|\diagdown|\diagdown$
Left Hand $W|\diagup|\diagup|\diagup|\diagup$

the primary classification would be $\frac{5}{17}$ and the sub-classification would be $\frac{U}{U}$. Since both the right and left index fingers are ulnar loops the formula would then read $\frac{5}{17}\ \frac{U}{U}$, etc.

If in the above set the right index finger was a tented arch, the sub-classification would be $\frac{T}{U}$; if a radial loop, $\frac{R}{U}$, etc. The first lettered combination for the sub-classification is $\frac{A}{A}$ and the last is $\frac{W}{W}$. Following is the method of forming these combinations and the order of their arrangement:

$$\frac{A}{A}\ \frac{T}{A}\ \frac{R}{A}\ \frac{U}{A}\ \frac{W}{A}$$

$$\frac{A}{T}\ \frac{T}{T}\ \frac{R}{T}\ \frac{U}{T}\ \frac{W}{T}$$

$$\frac{A}{R}\ \frac{T}{R}\ \frac{R}{R}\ \frac{U}{R}\ \frac{W}{R}$$

$$\frac{A}{U}\ \frac{T}{U}\ \frac{R}{U}\ \frac{U}{U}\ \frac{W}{U}$$

$$\frac{A}{W}\ \frac{T}{W}\ \frac{R}{W}\ \frac{U}{W}\ \frac{W}{W}$$

LETTERED FORMULA

Having learned the primary and sub-classification the next concern is the lettered formula. This classification applies to all sets of impressions in which the plain arch, tented arch, exceptional arch, or radial loop appears in digits other than the index finger. In the following imaginary sets of impressions will be explained the lettered formula.

Illustration 1

Right Hand \ | \ | *a* | \ | \
Left Hand / | / | / | / | /

$$= \frac{1\ \ Ua}{1\ \ U}$$

In this set of impressions the arch appears in the right middle finger, thus eliminating any possible division by the ridge count. The formula then is $\frac{1\ \ Ua}{1\ \ U}$; 1 over 1 for the primary

classification and *U*-small *a* over *U* for the lettered classification.

Illustration 2

Left Hand \ | \ | / | \ | \
Right Hand / | / | / | / | /

$$= \frac{1 \quad U}{1 \quad Ur}$$

In this set a radial loop appears in the right middle finger, which eliminates any division by ridge counting, thus giving the formula $\frac{1 \quad Ur}{1 \quad U}$.

Illustration 3

Right Hand \ | \ | \ | \ | \
Left Hand / | *W* | *a* | / | /

In this set of impressions the arch appears in the left middle finger, eliminating ridge division and producing the formula $\frac{1 \quad U}{3 \quad Wa}$.

Illustration 4

Right Hand \ | *W* | \ | *a* | \
Left Hand \ | *W* | / | / | /

In this set of impressions an arch appears in the right ring finger and a radial loop appears in the left thumb, producing the formula $\frac{17 \quad Wa}{3 \quad rW}$.

Illustration 5

Right Hand \ | \ | \ | *a* | *a*
Left Hand / | / | / | / | /

In this set of impressions an arch appears in both the right ring and the right little finger, which gives the lettered formula $\frac{1 \quad U \quad 2a}{1 \quad U}$. It will be noted that the *a-a* is expressed in the formula as *2a,* thus sufficiently noting the two arches and briefing the statement.

Illustration 6

Right Hand $\backslash \mid \backslash \mid a \mid t \mid /$
Left Hand $/ \mid / \mid / \mid / \mid /$

In this set of impressions the right middle finger shows an arch, the right ring finger a tented arch and the right little finger a radial loop, which gives the formula $\frac{1 \quad U \quad atr}{1 \quad U}$.

When the plain, tented, and exceptional arches and the radial loop show in a set of impressions, write them in the formula in the order that they appear in the sets.

CLASSIFICATION RULES

Before considering the second sub-classification or the third character of the formula, four essential rules should be learned. These are:

1. That the plain, tented or exceptional arches appearing in either index finger eliminate any possible division by ridge counting or ridge tracing.

2. That the plain, tented or exceptional arches

or radial loop appearing in any other digit than the index finger eliminate any possible division by ridge counting or ridge tracing.

3. That the middle finger cannot be used with the index finger in forming the second subclassification unless it is the same type of pattern.

4. That the loop and whorl cannot be used together in forming a combination unless the index fingers are represented, one by a loop and one by a whorl.

SECOND SUB-CLASSIFICATION

Ridge counting and ridge tracing are the base methods of the second sub-classification. It appears in the formula at the right of the sub-classification, always represented by a combination of letters *I, M,* or *O.* It applies only to sets of impressions where the index fingers show the loop and whorl types, using the middle finger only where it is the same type as the index.

In illustrating and explaining the second sub-classification the following assumed or imaginary sets of impressions will have the primary and sub-classification given. Following this, all the variations of the second sub-classification for each set will be shown. Close observation of the order of these combinations is advised as essential.

Illustration No. 1

Right Hand $\backslash \mid \backslash \mid W \mid \backslash \mid \backslash$

Left Hand $/ \mid / \mid W \mid / \mid /$

Here the primary classification is $\frac{3}{9}$; the sub-classification is $\frac{U}{U}$, and the second sub-classification is one of the four variations $\frac{I}{I}, \frac{O}{I}, \frac{I}{O}, \frac{O}{O}$ obtained by counting the ridges of the right and left index fingers, giving a formula which would read $\frac{3 \quad U \quad I}{9 \quad U \quad I}$, $\frac{3 \quad U \quad O}{9 \quad U \quad I}$ or $\frac{3 \quad U \quad I}{9 \quad U \quad O}$, etc.

Illustration No. 2

Right Hand $\backslash \mid \backslash \mid W \mid \backslash \mid \backslash$

Left Hand $/ \mid / \mid / \mid / \mid /$

Here the primary classification is $\frac{1}{9}$; the sub-classification is $\frac{U}{U}$ and the second sub-classification is one of the eight variations or combinations $\frac{I}{II}$ $\frac{O}{II}$ $\frac{I}{IO}$ $\frac{O}{IO}$ $\frac{I}{OI}$ $\frac{O}{OI}$ $\frac{I}{OO}$ $\frac{O}{OO}$, obtained by counting the ridges of the right and left index fingers and left middle finger; giving a formula which reads: $\frac{1 \quad U \quad I}{9 \quad U \quad II}$, $\frac{1 \quad U \quad O}{9 \quad U \quad II}$, or $\frac{1 \quad U \quad I}{9 \quad U \quad IO}$ etc., using the variations directed by the ridge

counts in the right index, left index and left middle fingers.

The left middle finger in the above set is the same type of pattern as the left index finger, hence its use in the division.

Illustration No. 3

Right Hand $\backslash \mid \backslash \mid \backslash \mid W \mid \backslash$
Left Hand $/ \mid / \mid / \mid W \mid /$

In this set of impressions the primary classification is $\frac{9}{2}$; the sub-classification is $\frac{U}{U}$, and the second sub-classification will be one of the following sixteen variations:

$$\frac{II}{II}\ \frac{IO}{II}\ \frac{OI}{II}\ \frac{OO}{II}\ \frac{II}{IO}\ \frac{IO}{IO}\ \frac{OI}{IO}\ \frac{OO}{IO}$$

$$\frac{II}{OI}\ \frac{IO}{OI}\ \frac{OI}{OI}\ \frac{OO}{OI}\ \frac{II}{OO}\ \frac{IO}{OO}\ \frac{OI}{OO}\ \frac{OO}{OO}$$

obtained by counting the ridges of the right index, right middle, left index and left middle fingers. The formula here produced would read $\frac{9\ U\ II}{2\ U\ II}$, $\frac{9\ U\ IO}{2\ U\ II}$ or $\frac{9\ U\ OI}{2\ U\ II}$, etc. Using the variations directed by ridge count, the right and left middle fingers are the same types as the index finger.

Illustration No. 4

Right Hand \ | W | \ | \ | \
Left Hand / | / | / | / | /

In this set the primary classification is $\frac{17}{1}$, the sub-classification is $\frac{W}{U}$ and the second sub-classification is one of the following twelve combinations:

$\frac{I}{II}$ $\frac{M}{II}$ $\frac{O}{II}$ $\frac{I}{IO}$ $\frac{M}{IO}$ $\frac{O}{IO}$ $\frac{I}{OI}$ $\frac{M}{OI}$ $\frac{O}{OI}$ $\frac{I}{OO}$ $\frac{M}{OO}$ $\frac{O}{OO}$

obtained by tracing the ridges of the right index and counting the ridges of the left index and left middle fingers. The formula in this case would read: $\frac{17 \quad W \quad I}{1 \quad U \quad II}$, $\frac{17 \quad W \quad M}{1 \quad U \quad II}$ or $\frac{17 \quad W \quad O}{1 \quad U \quad II}$ etc., using the variations directed by the ridge count and ridge tracing. In the above set the right middle finger shows a loop, while the index finger shows a whorl, therefore the middle finger is not represented in the formula.

Illustration No. 5

Right Hand \ | W | W | \ | \
Left Hand / | / | / | / | /

Here the primary classification is $\frac{17}{9}$; the sub-classification is $\frac{W}{U}$ and the second sub-classifica-

tion, one of the following thirty-six variations:

$$\frac{II}{II}\ \frac{IM}{II}\ \frac{IO}{II}\ \frac{MI}{II}\ \frac{MM}{II}\ \frac{MO}{II}\ \frac{OI}{II}\ \frac{OM}{II}\ \frac{OO}{II}$$

$$\frac{II}{IO}\ \frac{IM}{IO}\ \frac{IO}{IO}\ \frac{MI}{IO}\ \frac{MM}{IO}\ \frac{MO}{IO}\ \frac{OI}{IO}\ \frac{OM}{IO}\ \frac{OO}{IO}$$

$$\frac{II}{OI}\ \frac{IM}{OI}\ \frac{IO}{OI}\ \frac{MI}{OI}\ \frac{MM}{OI}\ \frac{MO}{OI}\ \frac{OI}{OI}\ \frac{OM}{OI}\ \frac{OO}{OI}$$

$$\frac{II}{OO}\ \frac{IM}{OO}\ \frac{IO}{OO}\ \frac{MI}{OO}\ \frac{MM}{OO}\ \frac{MO}{OO}\ \frac{OI}{OO}\ \frac{OM}{OO}\ \frac{OO}{OO}$$

These are obtained by tracing the ridges of the right index and the right middle fingers and counting the ridges of the left index and left middle fingers, producing a formula which reads $\frac{17\ \ W\ \ II}{9\ \ U\ \ II}$ or $\frac{17\ \ W\ \ IM}{9\ \ U\ \ II}$ or $\frac{17\ \ W\ \ IO}{9\ \ U\ \ II}$, etc. Which variation to use is determined by ridge tracing and ridge counting. The loop and whorl are used together in forming the combination. In the above set this is made possible because the index fingers are represented, one by the loop and one by the whorl.

Illustration No. 6

Right Hand $\backslash \mid W \mid W \mid \backslash \mid \backslash$

Left Hand $/ \mid W \mid / \mid / \mid /$

In this case the primary classification is $\frac{11}{17}$.

the sub-classification is $\frac{W}{W}$, and the second sub-classification is one of the twenty-seven combinations:

$$\frac{II}{I}\ \frac{IM}{I}\ \frac{IO}{I}\ \frac{MI}{I}\ \frac{MM}{I}\ \frac{MO}{I}\ \frac{OI}{I}\ \frac{OM}{I}\ \frac{OO}{I}$$

$$\frac{II}{M}\ \frac{IM}{M}\ \frac{IO}{M}\ \frac{MI}{M}\ \frac{MM}{M}\ \frac{MO}{M}\ \frac{OI}{M}\ \frac{OM}{M}\ \frac{OO}{M}$$

$$\frac{II}{O}\ \frac{IM}{O}\ \frac{IO}{O}\ \frac{MI}{O}\ \frac{MM}{O}\ \frac{MO}{O}\ \frac{OI}{O}\ \frac{OM}{O}\ \frac{OO}{O}$$

obtained by tracing the ridges of the right index, the left index and the left middle fingers, producing a formula which reads $\frac{17\ \ W\ \ II}{11\ \ W\ \ I}$, $\frac{17\ \ W\ \ IM}{11\ \ W\ \ I}$ or $\frac{17\ \ W\ \ IO}{11\ \ W\ \ I}$, etc., the variation used being determined by ridge tracing. In the above set the left middle finger is not used in the combination because it is a loop, while the index finger is a whorl.

Illustration No. 7

Right Hand $W \mid W \mid W \mid W \mid W$

Left Hand $\overline{W \mid W \mid W \mid W \mid W}$

This set is composed entirely of numerical patterns. The primary classification is $\frac{32}{32}$ and

the sub-classification is $\frac{W}{W}$, and the second sub-classification is one of the following eighty-one combinations:

$$\frac{II}{II}\ \frac{IM}{II}\ \frac{IO}{II}\ \frac{MI}{II}\ \frac{MM}{II}\ \frac{MO}{II}\ \frac{OI}{II}\ \frac{OM}{II}\ \frac{OO}{II}$$

$$\frac{II}{IM}\ \frac{IM}{IM}\ \frac{IO}{IM}\ \frac{MI}{IM}\ \frac{MM}{IM}\ \frac{MO}{IM}\ \frac{OI}{IM}\ \frac{OM}{IM}\ \frac{OO}{IM}$$

$$\frac{II}{IO}\ \frac{IM}{IO}\ \frac{IO}{IO}\ \frac{MI}{IO}\ \frac{MM}{IO}\ \frac{MO}{IO}\ \frac{OI}{IO}\ \frac{OM}{IO}\ \frac{OO}{IO}$$

$$\frac{II}{MI}\ \frac{IM}{MI}\ \frac{IO}{MI}\ \frac{MI}{MI}\ \frac{MM}{MI}\ \frac{MO}{MI}\ \frac{OI}{MI}\ \frac{OM}{MI}\ \frac{OO}{MI}$$

$$\frac{II}{MM}\ \frac{IM}{MM}\ \frac{IO}{MM}\ \frac{MI}{MM}\ \frac{MM}{MM}\ \frac{MO}{MM}\ \frac{OI}{MM}\ \frac{OM}{MM}\ \frac{OO}{MM}$$

$$\frac{II}{MO}\ \frac{IM}{MO}\ \frac{IO}{MO}\ \frac{MI}{MO}\ \frac{MM}{MO}\ \frac{MO}{MO}\ \frac{OI}{MO}\ \frac{OM}{MO}\ \frac{OO}{MO}$$

$$\frac{II}{OI}\ \frac{IM}{OI}\ \frac{IO}{OI}\ \frac{MI}{OI}\ \frac{MM}{OI}\ \frac{MO}{OI}\ \frac{OI}{OI}\ \frac{OM}{OI}\ \frac{OO}{OI}$$

$$\frac{II}{OM}\ \frac{IM}{OM}\ \frac{IO}{OM}\ \frac{MI}{OM}\ \frac{MM}{OM}\ \frac{MO}{OM}\ \frac{OI}{OM}\ \frac{OM}{OM}\ \frac{OO}{OM}$$

$$\frac{II}{OO}\ \frac{IM}{OO}\ \frac{IO}{OO}\ \frac{MI}{OO}\ \frac{MM}{OO}\ \frac{MO}{OO}\ \frac{OI}{OO}\ \frac{OM}{OO}\ \frac{OO}{OO}$$

obtained by tracing the ridges of the right index,

right middle, left index finger and left middle finger, producing a formula which reads $\frac{32\ \ II}{32\ \ II}$ or $\frac{32\ \ IO}{32\ \ II}$ or $\frac{32\ \ IM}{32\ \ II}$, etc. The variation to be used is determined by ridge tracing.

In the illustrations here given in the analysis of the manner of forming the second sub-classification, the many variations should not be memorized. Such labor would be foolish and useless. Just observe the order carefully. All combinations are formed in the same order. Their arrangement is simple, for after all it is only using the letters *I, M* and *O* in as many different arrangements as possible. What seems a puzzle is easily solved by studying the order of arrangement.

FINAL CLASSIFICATION

For the last division of the formula the name is final classification. This is merely utilizing the ridge count of the right little finger. It is used in distributing sets of impressions having the same primary, the same sub and the same second sub-classification. It appears in the formula at the right of the second sub-classification.

For illustration:

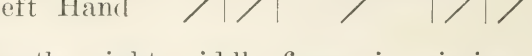
Right Hand \ | \ | \ | \ | \
Left Hand / | / | / | / | /

In this imaginary set of impressions, composed of ulnar loops, it is assumed that all are of the inner type, that in the right little finger there are seven ridge counts; for which the formula then would be $\frac{1\ U\ II\ 7}{1\ U\ II}$. Thus the final classification merely places the number designating the right little finger count in the formula at the right of the second sub-classification.

CLASSIFYING BROKEN SETS

In sets of impressions where one or more of the digits is missing or where the impression is disfigured to such an extent that it is impossible to determine its type, the missing or disfigured digit is assumed to be of the same type as the corresponding digit in the opposite hand and is classified as such.

Example



Here the right middle finger is missing. In the left middle finger an ulnar loop shows. In classifying this set the right middle finger is an ulnar loop of the same class as the ulnar loop in the left middle finger.

In sets of impressions where the same digit of both hands is missing, both missing digits are

assumed to be whorls and classified as meet whorls.

Example

Right Hand \ | Missing | \ | \ | \
Left Hand / | Missing | / | / | /

In this set both the right and left index fingers are missing. They are assumed to be whorls and are classified as meet. Thus a formula for the above would read: $\frac{17 \quad W \quad M}{3 \quad W \quad M}$, because both are assumed to be whorls and in the formula they appear as $\frac{M}{M}$.

RING FINGER COUNT

Classification by the use of the index and middle finger patterns afford insufficient scope. Sets accumulate excessively under certain formulas in files of half a million or so impressions. This requires unnecessary time to search and compare. Labor is therefore saved by carrying the second sub-classification to the ring finger. This extension does not change the method of filing and is only used where all the impressions of a set are all of the ulnar loop type or all of the whorl type. How to use the ring finger in these two combinations is here illustrated:

Right Hand \ \ \ | \ | \
Left Hand / | / | / | / | /

In using the ring finger as part of the formula the ulnar loop is determined by the ridge count, for which the balance or mid-count is twelve. If the loop in the ring finger has twelve or less counts it is termed inner. If the count exceeds twelve (thirteen or more) the loop is termed outer. For a set of impressions composed wholly of ulnar loops as the above, using the ring finger, the primary and sub-classification are $\frac{1\ U}{1\ U}$; the second sub-classification is one of the following combinations designated by ridge count.

III / III	IIO / III	IOI / III	IOO / III	OII / III	OIO / III	OOI / III	OOO / III
III / IIO	IIO / IIO	IOI / IIO	IOO / IIO	OII / IIO	OIO / IIO	OOI / IIO	OOO / IIO
III / IOI	IIO / IOI	IOI / IOI	IOO / IOI	OII / IOI	OIO / IOI	OOI / IOI	OOO / IOI
III / IOO	IIO / IOO	IOI / IOO	IOO / IOO	OII / IOO	OIO / IOO	OOI / IOO	OOO / IOO
III / OII	IIO / OII	IOI / OII	IOO / OII	OII / OII	OIO / OII	OOI / OII	OOO / OII
III / OIO	IIO / OIO	IOI / OIO	IOO / OIO	OII / OIO	OIO / OIO	OOI / OIO	OOO / OIO

$$\frac{III}{OOI}\quad\frac{IIO}{OOI}\quad\frac{IOI}{OOI}\quad\frac{IOO}{OOI}\quad\frac{OII}{OOI}\quad\frac{OIO}{OOI}\quad\frac{OOI}{OOI}\quad\frac{OOO}{OOI}$$

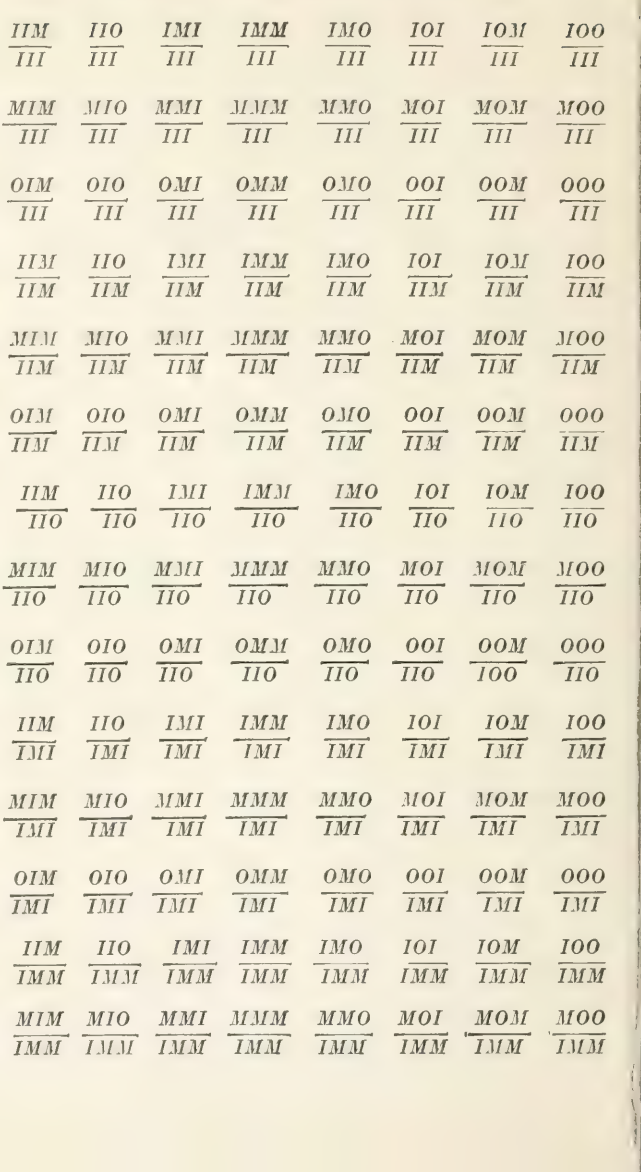
$$\frac{III}{OOO}\quad\frac{IIO}{OOO}\quad\frac{IOI}{OOO}\quad\frac{IOO}{OOO}\quad\frac{OII}{OOO}\quad\frac{OIO}{OOO}\quad\frac{OOI}{OOO}\quad\frac{OOO}{OOO}$$

Use of the ring finger in the above set gives sixty-four combinations or divisions, while the index and middle fingers give but sixteen.

For a set of impressions composed entirely of whorls, as

$$\begin{array}{ll}\text{Right Hand} & \overline{W \mid W \mid W \mid W \mid W} \\ \text{Left Hand} & \overline{W \mid W \mid W \mid W \mid W}\end{array}$$

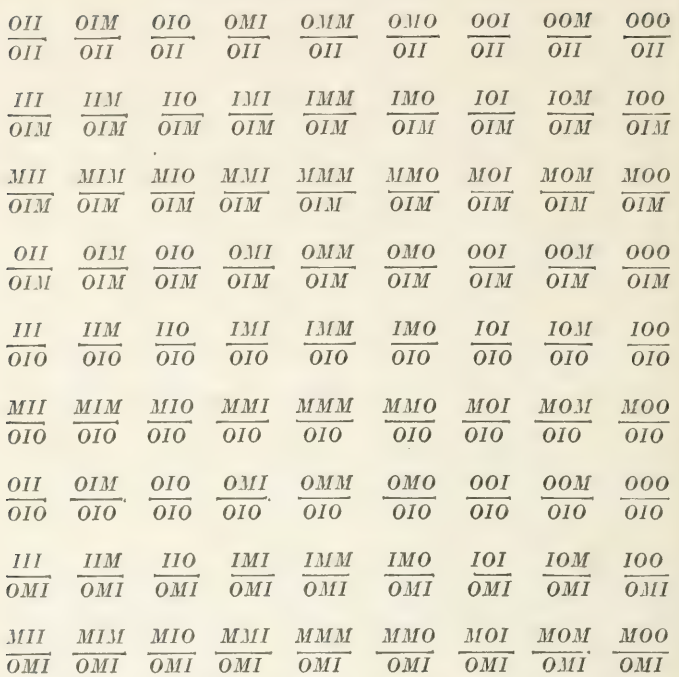
Using the ring finger, the primary and sub-classification would be $\frac{32\quad W}{32\quad W}$; while the second sub-classification would be one of the following seven hundred and twenty-nine combinations, determined by ridge tracing.


III IIM IIO IMI IMM IMO IOI IOM IOO
III III III III III III III III III
MII MIM MIO MMI MMM MMO MOI MOM MOO
III III III III III III III III III
OII OIM OIO OMI OMM OMO OOI OOM OOO
III III III III III III III III III
III IIM IIO IMI IMM IMO IOI IOM IOO
IIM IIM IIM IIM IIM IIM IIM IIM IIM
MII MIM MIO MMI MMM MMO MOI MOM MOO
IIM IIM IIM IIM IIM IIM IIM IIM IIM
OII OIM OIO OMI OMM OMO OOI OOM OOO
IIM IIM IIM IIM IIM IIM IIM IIM IIM
III IIM IIO IMI IMM IMO IOI IOM IOO
IIO IIO IIO IIO IIO IIO IIO IIO IIO
MII MIM MIO MMI MMM MMO MOI MOM MOO
IIO IIO IIO IIO IIO IIO IIO IIO IIO
OII OIM OIO OMI OMM OMO OOI OOM OOO
IIO IIO IIO IIO IIO IIO IIO IOO IIO
III IIM IIO IMI IMM IMO IOI IOM IOO
IMI IMI IMI IMI IMI IMI IMI IMI IMI
MII MIM MIO MMI MMM MMO MOI MOM MOO
IMI IMI IMI IMI IMI IMI IMI IMI IMI
OII OIM OIO OMI OMM OMO OOI OOM OOO
IMI IMI IMI IMI IMI IMI IMI IMI IMI
III IIM IIO IMI IMM IMO IOI IOM IOO
IMM IMM IMM IMM IMM IMM IMM IMM IMM
MII MIM MIO MMI MMM MMO MOI MOM MOO
IMM IMM IMM IMM IMM IMM IMM IMM IMM

OII / *IMM*	*OIM* / *IMM*	*OIO* / *IMM*	*OMI* / *IMM*	*OMM* / *IMM*	*OMO* / *IMM*	*OOI* / *IMM*	*OOM* / *IMM*	*OOO* / *IMM*
III / *IMO*	*IIM* / *IMO*	*IIO* / *IMO*	*IMI* / *IMO*	*IMM* / *IMO*	*IMO* / *IMO*	*IOI* / *IMO*	*IOM* / *IMO*	*IOO* / *IMO*
MII / *IMO*	*MIM* / *IMO*	*MIO* / *IMO*	*MMI* / *IMO*	*MMM* / *IMO*	*MMO* / *IMO*	*MOI* / *IMO*	*MOM* / *IMO*	*MOO* / *IMO*
OII / *IMO*	*OIM* / *IMO*	*OIO* / *IMO*	*OMI* / *IMO*	*OMM* / *IMO*	*OMO* / *IMO*	*OOI* / *IMO*	*OOM* / *IMO*	*OOO* / *IMO*
III / *IOI*	*IIM* / *IOI*	*IIO* / *IOI*	*IMI* / *IOI*	*IMM* / *IOI*	*IMO* / *IOI*	*IOI* / *IOI*	*IOM* / *IOI*	*IOO* / *IOI*
MII / *IOI*	*MIM* / *IOI*	*MIO* / *IOI*	*MMI* / *IOI*	*MMM* / *IOI*	*MMO* / *IOI*	*MOI* / *IOI*	*MOM* / *IOI*	*MOO* / *IOI*
OII / *IOI*	*OIM* / *IOI*	*OIO* / *IOI*	*OMI* / *IOI*	*OMM* / *IOI*	*OMO* / *IOI*	*OOI* / *IOI*	*OOM* / *IOI*	*OOO* / *IOI*
III / *IOM*	*IIM* / *IOM*	*IIO* / *IOM*	*IMI* / *IOM*	*IMM* / *IOM*	*IMO* / *IOM*	*IOI* / *IOM*	*IOM* / *IOM*	*IOO* / *IOM*
MII / *IOM*	*MIM* / *IOM*	*MIO* / *IOM*	*MMI* / *IOM*	*MMM* / *IOM*	*MMO* / *IOM*	*MOI* / *IOM*	*MOM* / *IOM*	*MOO* / *IOM*
OII / *IOM*	*OIM* / *IOM*	*OIO* / *IOM*	*OMI* / *IOM*	*OMM* / *IOM*	*OMO* / *IOM*	*OOI* / *IOM*	*OOM* / *IOM*	*OOO* / *IOM*
III / *IOO*	*IIM* / *IOO*	*IIO* / *IOO*	*IMI* / *IOO*	*IMM* / *IOO*	*IMO* / *IOO*	*IOI* / *IOO*	*IOM* / *IOO*	*IOO* / *IOO*
MII / *IOO*	*MIM* / *IOO*	*MIO* / *IOO*	*MMI* / *IOO*	*MMM* / *IOO*	*MMO* / *IOO*	*MOI* / *IOO*	*MOM* / *IOO*	*MOO* / *IOO*
OII / *IOO*	*OIM* / *IOO*	*OIO* / *IOO*	*OMI* / *IOO*	*OMM* / *IOO*	*OMO* / *IOO*	*OOI* / *IOO*	*OOM* / *IOO*	*OOO* / *IOO*
III / *MII*	*IIM* / *MII*	*IIO* / *MII*	*IMI* / *MII*	*IMM* / *MII*	*IMO* / *MII*	*IOI* / *MII*	*IOM* / *MII*	*IOO* / *MII*

$\frac{MII}{MII}$	$\frac{MIM}{MII}$	$\frac{MIO}{MII}$	$\frac{MMI}{MII}$	$\frac{MMM}{MII}$	$\frac{MMO}{MII}$	$\frac{MOI}{MII}$	$\frac{MOM}{MII}$	$\frac{MOO}{MII}$
$\frac{OII}{MII}$	$\frac{OIM}{MII}$	$\frac{OIO}{MII}$	$\frac{OMI}{MII}$	$\frac{OMM}{MII}$	$\frac{OMO}{MII}$	$\frac{OOI}{MII}$	$\frac{OOM}{MII}$	$\frac{OOO}{MII}$
$\frac{III}{MIM}$	$\frac{IIM}{MIM}$	$\frac{IIO}{MIM}$	$\frac{IMI}{MIM}$	$\frac{IMM}{MIM}$	$\frac{IMO}{MIM}$	$\frac{IOI}{MIM}$	$\frac{IOM}{MIM}$	$\frac{IOO}{MIM}$
$\frac{MII}{MIM}$	$\frac{MIM}{MIM}$	$\frac{MIO}{MIM}$	$\frac{MMI}{MIM}$	$\frac{MMM}{MIM}$	$\frac{MMO}{MIM}$	$\frac{MOI}{MIM}$	$\frac{MOM}{MIM}$	$\frac{MOO}{MIM}$
$\frac{OII}{MIM}$	$\frac{OIM}{MIM}$	$\frac{OIO}{MIM}$	$\frac{OMI}{MIM}$	$\frac{OMM}{MIM}$	$\frac{OMO}{MIM}$	$\frac{OOI}{MIM}$	$\frac{OOM}{MIM}$	$\frac{OOO}{MIM}$
$\frac{III}{MIO}$	$\frac{IIM}{MIO}$	$\frac{IIO}{MIO}$	$\frac{IMI}{MIO}$	$\frac{IMM}{MIO}$	$\frac{IMO}{MIO}$	$\frac{IOI}{MIO}$	$\frac{IOM}{MIO}$	$\frac{IOO}{MIO}$
$\frac{MII}{MIO}$	$\frac{MIM}{MIO}$	$\frac{MIO}{MIO}$	$\frac{MMI}{MIO}$	$\frac{MMM}{MIO}$	$\frac{MMO}{MIO}$	$\frac{MOI}{MIO}$	$\frac{MOM}{MIO}$	$\frac{MOO}{MIO}$
$\frac{OII}{MIO}$	$\frac{OIM}{MIO}$	$\frac{OIO}{MIO}$	$\frac{OMI}{MIO}$	$\frac{OMM}{MIO}$	$\frac{OMO}{MIO}$	$\frac{OOI}{MIO}$	$\frac{OOM}{MIO}$	$\frac{OOO}{MIO}$
$\frac{III}{MMI}$	$\frac{IIM}{MMI}$	$\frac{IIO}{MMI}$	$\frac{IMI}{MMI}$	$\frac{IMM}{MMI}$	$\frac{IMO}{MMI}$	$\frac{IOI}{MMI}$	$\frac{IOM}{MMI}$	$\frac{IOO}{MMI}$
$\frac{MII}{MMI}$	$\frac{MIM}{MMI}$	$\frac{MIO}{MMI}$	$\frac{MMI}{MMI}$	$\frac{MMM}{MMI}$	$\frac{MMO}{MMI}$	$\frac{MOI}{MMI}$	$\frac{MOM}{MMI}$	$\frac{MOO}{MMI}$
$\frac{OII}{MMI}$	$\frac{OIM}{MMI}$	$\frac{OIO}{MMI}$	$\frac{OMI}{MMI}$	$\frac{OMM}{MMI}$	$\frac{OMO}{MMI}$	$\frac{OOI}{MMI}$	$\frac{OOM}{MMI}$	$\frac{OOO}{MMI}$
$\frac{III}{MMM}$	$\frac{IIM}{MMM}$	$\frac{IIO}{MMM}$	$\frac{IMI}{MMM}$	$\frac{IMM}{MMM}$	$\frac{IMO}{MMM}$	$\frac{IOI}{MMM}$	$\frac{IOM}{MMM}$	$\frac{IOO}{MMM}$
$\frac{MII}{MMM}$	$\frac{MIM}{MMM}$	$\frac{MIO}{MMM}$	$\frac{MMI}{MMM}$	$\frac{MMM}{MMM}$	$\frac{MMO}{MMM}$	$\frac{MOI}{MMM}$	$\frac{MOM}{MMM}$	$\frac{MOO}{MMM}$
$\frac{OII}{MMM}$	$\frac{OIM}{MMM}$	$\frac{OIO}{MMM}$	$\frac{OMI}{MMM}$	$\frac{OMM}{MMM}$	$\frac{OMO}{MMM}$	$\frac{OOI}{MMM}$	$\frac{OOM}{MMM}$	$\frac{OOO}{MMM}$

III / MMO	IIM / MMO	IIO / MMO	IMI / MMO	IMM / MMO	IMO / MMO	IOI / MMO	IOM / MMO	IOO / MMO
MII / MMO	MIM / MMO	MIO / MMO	MMI / MMO	MMM / MMO	MMO / MMO	MOI / MMO	MOM / MMO	MOO / MMO
OII / MMO	OIM / MMO	OIO / MMO	OMI / MMO	OMM / MMO	OMO / MMO	OOI / MMO	OOM / MMO	OOO / MMO
III / MOI	IIM / MOI	IIO / MOI	IMI / MOI	IMM / MOI	IMO / MOI	IOI / MOI	IOM / MOI	IOO / MOI
MII / MOI	MIM / MOI	MIO / MOI	MMI / MOI	MMM / MOI	MMO / MOI	MOI / MOI	MOM / MOI	MOO / MOI
OII / MOI	OIM / MOI	OIO / MOI	OMI / MOI	OMM / MOI	OMO / MOI	OOI / MOI	OOM / MOI	OOO / MOI
III / MOM	IIM / MOM	IIO / MOM	IMI / MOM	IMM / MOM	IMO / MOM	IOI / MOM	IOM / MOM	IOO / MOM
MII / MOM	MIM / MOM	MIO / MOM	MMI / MOM	MMM / MOM	MMO / MOM	MOI / MOM	MOM / MOM	MOO / MOM
OII / MOM	OIM / MOM	OIO / MOM	OMI / MOM	OMM / MOM	OMO / MOM	OOI / MOM	OOM / MOM	OOO / MOM
III / MOO	IIM / MOO	IIO / MOO	IMI / MOO	IMM / MOO	IMO / MOO	IOI / MOO	IOM / MOO	IOO / MOO
MII / MOO	MIM / MOO	MIO / MOO	MMI / MOO	MMM / MOO	MMO / MOO	MOI / MOO	MOM / MOO	MOO / MOO
OII / MOO	OIM / MOO	OIO / MOO	OMI / MOO	OMM / MOO	OMO / MOO	OOI / MOO	OOM / MOO	OOO / MOO
III / OII	IIM / OII	IIO / OII	IMI / OII	IMM / OII	IMO / OII	IOI / OII	IOM / OII	IOO / OII
MII / OII	MIM / OII	MIO / OII	MMI / OII	MMM / OII	MMO / OII	MOI / OII	MOM / OII	MOO / OII


OII OIM OIO OMI OMM OMO OOI OOM OOO
OII OII OII OII OII OII OII OII OII
III IIM IIO IMI IMM IMO IOI IOM IOO
OIM OIM OIM OIM OIM OIM OIM OIM OIM
MII MIM MIO MMI MMM MMO MOI MOM MOO
OIM OIM OIM OIM OIM OIM OIM OIM OIM
OII OIM OIO OMI OMM OMO OOI OOM OOO
OIM OIM OIM OIM OIM OIM OIM OIM OIM
III IIM IIO IMI IMM IMO IOI IOM IOO
OIO OIO OIO OIO OIO OIO OIO OIO OIO
MII MIM MIO MMI MMM MMO MOI MOM MOO
OIO OIO OIO OIO OIO OIO OIO OIO OIO
OII OIM OIO OMI OMM OMO OOI OOM OOO
OIO OIO OIO OIO OIO OIO OIO OIO OIO
III IIM IIO IMI IMM IMO IOI IOM IOO
OMI OMI OMI OMI OMI OMI OMI OMI OMI
MII MIM MIO MMI MMM MMO MOI MOM MOO
OMI OMI OMI OMI OMI OMI OMI OMI OMI
OII OIM OIO OMI OMM OMO OOI OOM OOO
OMI OMI OMI OMI OMI OMI OMI OMI OMI
III IIM IIO IMI IMM IMO IOI IOM IOO
OMM OMM OMM OMM OMM OMM OMM OMM OMM
MII MIM MIO MMI MMM MMO MOI MOM MOO
OMM OMM OMM OMM OMM OMM OMM OMM OMM
OII OIM OIO OMI OMM OMO OOI OOM OOO
OMM OMM OMM OMM OMM OMM OMM OMM OMM
III IIM IIO IMI IMM IMO IOI IOM IOO
OMO OMO OMO OMO OMO OMO OMO OMO OMO

MII / *OMO*	*MIM* / *OMO*	*MIO* / *OMO*	*MMI* / *OMO*	*MMM* / *OMO*	*MMO* / *OMO*	*MOI* / *OMO*	*MOM* / *OMO*	*MOO* / *OMO*
OII / *OMO*	*OIM* / *OMO*	*OIO* / *OMO*	*OMI* / *OMO*	*OMM* / *OMO*	*OMO* / *OMO*	*OOI* / *OMO*	*OOM* / *OMO*	*OOO* / *OMO*
III / *OOI*	*IIM* / *OOI*	*IIO* / *OOI*	*IMI* / *OOI*	*IMM* / *OOI*	*IMO* / *OOI*	*IOI* / *OOI*	*IOM* / *OOI*	*IOO* / *OOI*
MII / *OOI*	*MIM* / *OOI*	*MIO* / *OOI*	*MMI* / *OOI*	*MMM* / *OOI*	*MMO* / *OOI*	*MOI* / *OOI*	*MOM* / *OOI*	*MOO* / *OOI*
OII / *OOI*	*OIM* / *OOI*	*OIO* / *OOI*	*OMI* / *OOI*	*OMM* / *OOI*	*OMO* / *OOI*	*OOI* / *OOI*	*OOM* / *OOI*	*OOO* / *OOI*
III / *OOM*	*IIM* / *OOM*	*IIO* / *OOM*	*IMI* / *OOM*	*IMM* / *OOM*	*IMO* / *OOM*	*IOI* / *OOM*	*IOM* / *OOM*	*IOO* / *OOM*
MII / *OOM*	*MIM* / *OOM*	*MIO* / *OOM*	*MMI* / *OOM*	*MMM* / *OOM*	*MMO* / *OOM*	*MOI* / *OOM*	*MOM* / *OOM*	*MOO* / *OOM*
OII / *OOM*	*OIM* / *OOM*	*OIO* / *OOM*	*OMI* / *OOM*	*OMM* / *OOM*	*OMO* / *OOM*	*OOI* / *OOM*	*OOM* / *OOM*	*OOO* / *OOM*
III / *OOO*	*IIM* / *OOO*	*IIO* / *OOO*	*IMI* / *OOO*	*IMM* / *OOO*	*IMO* / *OOO*	*IOI* / *OOO*	*IOM* / *OOO*	*IOO* / *OOO*
MII / *OOO*	*MIM* / *OOO*	*MIO* / *OOO*	*MMI* / *OOO*	*MMM* / *OOO*	*MMO* / *OOO*	*MOI* / *OOO*	*MOM* / *OOO*	*MOO* / *OOO*
OII / *OOO*	*OIM* / *OOO*	*OIO* / *OOO*	*OMI* / *OOO*	*OMM* / *OOO*	*OMO* / *OOO*	*OOI* / *OOO*	*OOM* / *OOO*	*OOO* / *OOO*

By the use of the third or ring finger in the foregoing second sub-classification the number of combinations increased from eighty-one to seven hundred and twenty-nine. Memorization of the whole set would be extremely difficult. It will be noted that the above set begins with $\frac{III}{III}$ and runs down through the possible seven hundred and twenty-nine changes to $\frac{OOO}{OOO}$. To carefully study the various changes of numerator and denominator is all that is necessary to prepare the operator to read a formula and, from it, almost instantly to find the set of impressions in the file. This last classification is only used in files of several hundred thousand sheets, but is nevertheless interesting to all operators and experts.

CHAPTER V

FILING, SEARCHING AND COMPARING

The finger print file may be likened to an encyclopedia. If an inquiry is made regarding an individual topic, you at once consult the index. The index gives the topic location by referring you to page 100, 117, etc., as the case may be. The designated page is turned to at once, because each page is numbered and these numbers have been arranged in order according to their value.

In finger prints, each set of prints has a formula. This formula is to a set of prints, what the number is to the page. The method and order of arranging these formulas so that a ready reference can be made to any individual set is termed filing. Reproductions of sets of prints are shown in Figures 43 to 50.

ORDER OF FILING

A set formula consists of four distinct divisions, the order of each division is given, separately, without regard to other divisions:

Formula.— 1. Primary Division. 2. Sub-Division. 3. Second Sub-Division. 4. Final Division.

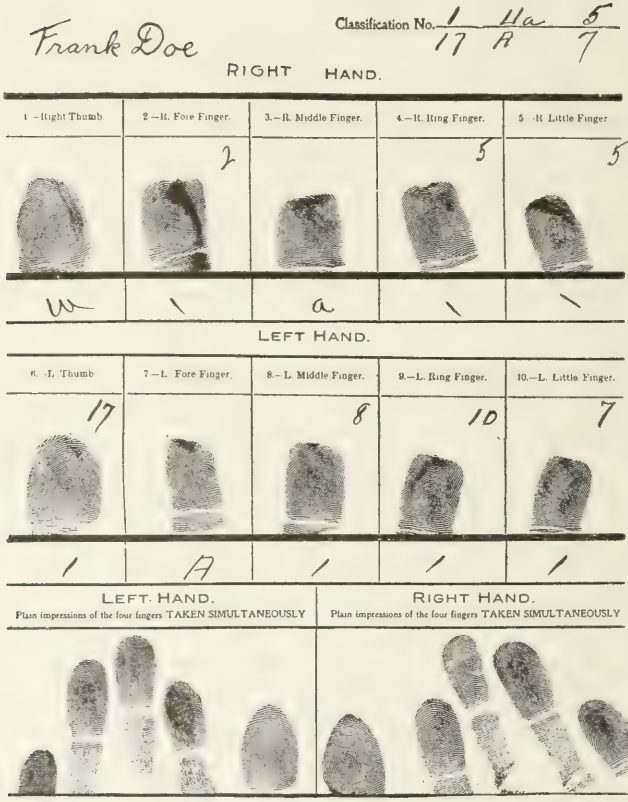


Figure 43.—A Set of Prints and Their Classification.

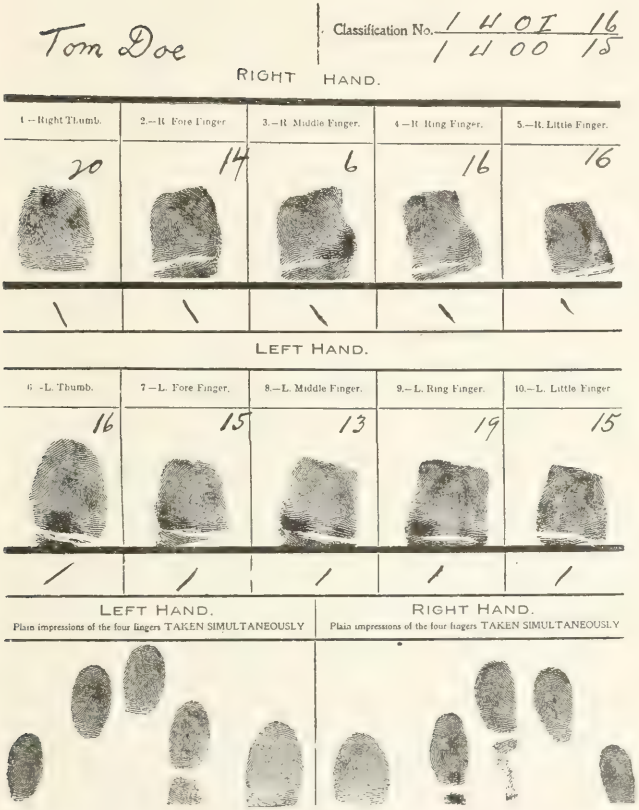


Figure 44.—A Set of Prints and Their Classification.

The first division is formed by the combination of numbers from 1 to 32, and is filed in numerical order.

The second division is formed by the letters *A, T, R, U* and *W,* and is filed in alphabetical order with one exception; the *T* precedes the *R.*

The third division is formed by the letters *I, M* and *O,* and is filed in alphabetical order.

The order in which these divisions should be filed is here given, from the smallest to the greatest.

The first division order follows:

$$\frac{1}{1}\ \frac{2}{1}\ \frac{3}{1}\ \frac{4}{1}\ \frac{5}{1}\ \frac{6}{1}\ \frac{7}{1}\ \frac{8}{1}\ \frac{9}{1}\ \frac{10}{1}\ \frac{11}{1}\ \frac{15}{1}\ \frac{16}{1}\ \frac{17}{1}\ \frac{12}{1}\ \frac{13}{1}\ \frac{14}{1}\ \frac{18}{1}$$

$$\frac{19}{1}\ \frac{20}{1}\ \frac{21}{1}\ \frac{22}{1}\ \frac{23}{1}\ \frac{24}{1}\ \frac{25}{1}\ \frac{26}{1}\ \frac{27}{1}\ \frac{28}{1}\ \frac{29}{1}\ \frac{30}{1}\ \frac{31}{1}\ \frac{32}{1}$$

$$\frac{1}{2}\ \frac{2}{2}\ \frac{3}{2}\ \frac{4}{2}\ \frac{5}{2}\ \frac{6}{2}\ \frac{7}{2}\ \frac{8}{2}\ \frac{9}{2}\ \frac{10}{2}\ \frac{11}{2}\ \frac{12}{2}\ \frac{13}{2}\ \frac{14}{2}\ \frac{15}{2}\ \frac{16}{2}\ \frac{17}{2}\ \frac{18}{2}$$

$$\frac{19}{2}\ \frac{20}{2}\ \frac{21}{2}\ \frac{22}{2}\ \frac{23}{2}\ \frac{24}{2}\ \frac{25}{2}\ \frac{26}{2}\ \frac{27}{2}\ \frac{28}{2}\ \frac{29}{2}\ \frac{30}{2}\ \frac{31}{2}\ \frac{32}{2}$$

$$\frac{1}{3}\ \frac{2}{3}\ \frac{3}{3}\ \frac{4}{3}\ \frac{5}{3}\ \frac{6}{3}\ \frac{7}{3}\ \frac{8}{3}\ \frac{9}{3}\ \frac{10}{3}\ \frac{11}{3}\ \frac{12}{3}\ \frac{13}{3}\ \frac{14}{3}\ \frac{15}{3}\ \frac{16}{3}\ \frac{17}{3}\ \frac{18}{3}$$

$$\frac{19}{3}\ \frac{20}{3}\ \frac{21}{3}\ \frac{22}{3}\ \frac{23}{3}\ \frac{24}{3}\ \frac{25}{3}\ \frac{26}{3}\ \frac{27}{3}\ \frac{28}{3}\ \frac{29}{3}\ \frac{30}{3}\ \frac{31}{3}\ \frac{32}{3}$$

Follow the above method throughout to $\frac{32}{32}$.

The second division order is as follows:

$$\frac{A}{A}\ \frac{T}{A}\ \frac{R}{A}\ \frac{U}{A}\ \frac{W}{A}$$

$$\frac{A}{T}\ \frac{T}{T}\ \frac{R}{T}\ \frac{U}{T}\ \frac{W}{T}$$

$$\frac{A}{R}\ \frac{T}{R}\ \frac{R}{R}\ \frac{U}{R}\ \frac{W}{R}$$

$$\frac{A}{U}\ \frac{T}{U}\ \frac{R}{U}\ \frac{U}{U}\ \frac{W}{U}$$

$$\frac{A}{W}\ \frac{T}{W}\ \frac{R}{W}\ \frac{U}{W}\ \frac{W}{W}$$

The small letters, *a, t, r,* appear with the above combinations. They are filed in the following order:

$$\frac{A}{A}\ \frac{aA}{A}\ \frac{tA}{A}\ \frac{rA}{A}\ \frac{Aa}{A}\ \frac{At}{A}\ \frac{Ar}{A}\ \frac{aAa}{A}\ \frac{tAa}{A}\ \frac{rAa}{A}\ \frac{aAt}{A}\ \frac{tAt}{A}$$

$$\frac{rAt}{A}\ \frac{aAr}{A}\ \frac{tAr}{A}\ \frac{rAr}{A}\ \frac{A2a}{A}\ \frac{Ata}{A}\ \frac{Ara}{A}\ \frac{Aat}{A}\ \frac{A2t}{A}\ \frac{Art}{A}\ \frac{Aar}{A}$$

$$\frac{Atr}{A}\ \frac{A2r}{A}\ \frac{aA2a}{A}\ \frac{tA2a}{A}\ \frac{rA2a}{A}\ \frac{aAta}{A}\ \frac{tAta}{A}\ \frac{rAta}{A}\ \frac{aAra}{A}$$

$$\frac{tAra}{A}\ \frac{rAra}{A}\ \frac{aAat}{A}\ \frac{tAat}{A}\ \frac{rAat}{A}\ \frac{aA2t}{A}\ \frac{tA2t}{A}\ \frac{rA2t}{A}$$

aArt	*tArt*	*rArt*	*aAar*	*tAar*	*rAar*	*aAtr*	*tAtr*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*
rAtr	*aA2r*	*tA2r*	*rA2r*	*A3a*	*At2a*	*Ar2a*	*Aaia*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*
A2ta	*Arta*	*Aara*	*Atra*	*A2ra*	*A2at*	*Atat*	*Arat*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Aa2t	*A3t*	*Ar2t*	*Aart*	*Atrt*	*A2rt*	*A2ar*	*Atar*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Arar	*Aatr*	*A2tr*	*Artr*	*Aa2r*	*At2t*	*A3r*	*Aa3a*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*
tA3a	*rA3a*	*aAt2a*	*tAt2a*	*rAt2a*	*aAr2a*	*tAr2a*	
A	*A*	*A*	*A*	*A*	*A*	*A*	
rAr2a	*aAata*	*tAata*	*rAata*	*aA2ta*	*tA2ta*	*aA2ta*	
A	*A*	*A*	*A*	*A*	*A*	*A*	
aArta	*tArta*	*rArta*	*aAara*	*tAara*	*rAara*	*aAtra*	
A	*A*	*A*	*A*	*A*	*A*	*A*	
tAtra	*rAtra*	*aA2ra*	*tA2ra*	*rA2ra*	*aA2at*	*tA2at*	
A	*A*	*A*	*A*	*A*	*A*	*A*	
rA2at	*aAtat*	*tAtat*	*rAtat*	*aArat*	*tArat*	*rArat*	
A	*A*	*A*	*A*	*A*	*A*	*A*	
aAa2t	*tAa2t*	*rAa2t*	*aA3t*	*tA3t*	*rA3t*	*aAr2t*	*tAr2t*
A	*A*	*A*	*A*	*A*	*A*	*A*	*A*

$$\frac{rAr2t}{A} \quad \frac{aAart}{A} \quad \frac{tAart}{A} \quad \frac{rAart}{A} \quad \frac{aAtrt}{A} \quad \frac{tAtra}{A} \quad \frac{rAtrt}{A}$$

$$\frac{aA2rt}{A} \quad \frac{tA2rt}{A} \quad \frac{rA2rt}{A} \quad \frac{aA2ar}{A} \quad \frac{tA2ar}{A} \quad \frac{rA2ar}{A} \quad \frac{aAtar}{A}$$

$$\frac{tAtar}{A} \quad \frac{rAtar}{A} \quad \frac{aArar}{A} \quad \frac{tArar}{A} \quad \frac{rArar}{A} \quad \frac{aAatr}{A} \quad \frac{tAatr}{A}$$

$$\frac{rAatr}{A} \quad \frac{aA2tr}{A} \quad \frac{tA2tr}{A} \quad \frac{rA2tr}{A} \quad \frac{aArtr}{A} \quad \frac{tArtr}{A} \quad \frac{rArtr}{A}$$

$$\frac{aAa2r}{A} \quad \frac{tAa2r}{A} \quad \frac{rAa2r}{A} \quad \frac{aAt2r}{A} \quad \frac{tAt2r}{A} \quad \frac{rAt2r}{A} \quad \frac{aA3r}{A}$$

$$\frac{tA3r}{A} \quad \frac{rA3r}{A}$$

By using each of the above numerators separately as the denominator, as $\frac{A}{aA}$, $\frac{aA}{aA}$ and $\frac{tA}{aA}$, $\frac{aA}{rA}$, $\frac{Aa}{aA}$, etc., we have practically an unlimited combination; to be exact we have 160×160 which is 25,600 combinations.

These combinations do not change in order when used with the second character, or subdivision, in the formula.

Classifications are filed in the order as they appear above.

The third division order is as follows:

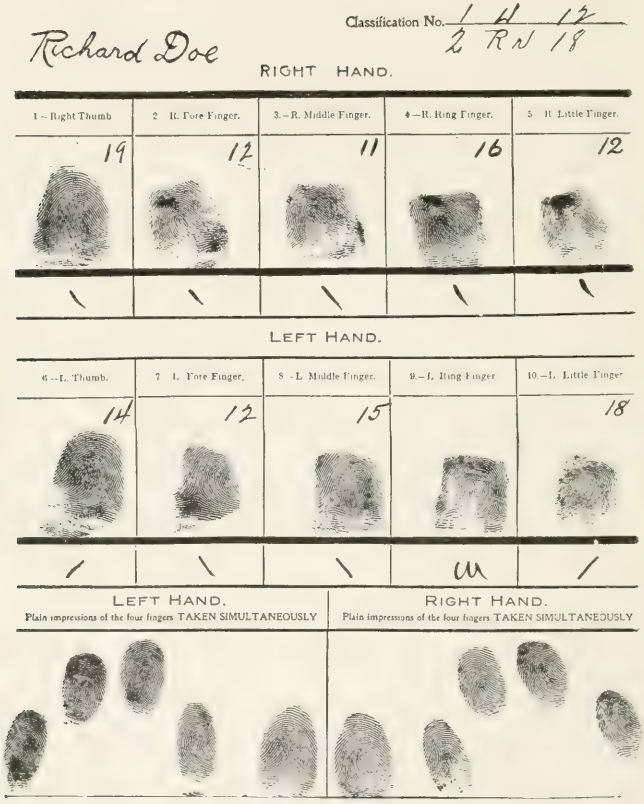


Figure 45.—A Set of Prints and Their Classification.

I and *O* for index fingers only.

(1)	(2)	(3)	(4)
I	*O*	*I*	*O*
I	*I*	*O*	*O*

I, *M* and *O* for index fingers only.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I	*M*	*O*	*I*	*M*	*O*	*I*	*M*	*O*
I	*I*	*I*	*M*	*M*	*M*	*O*	*O*	*O*

I and *O* combinations for index and middle fingers.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
II	*IO*	*OI*	*OO*	*II*	*IO*	*OI*	*OO*	*II*
II	*II*	*II*	*II*	*IO*	*IO*	*IO*	*IO*	*OI*

(10)	(11)	(12)	(13)	(14)	(15)	(16)
IO	*OI*	*OO*	*II*	*IO*	*OI*	*OO*
OI	*OI*	*OI*	*OO*	*OO*	*OO*	*OO*

I, *M* and *O* for index and middle fingers.

II	*IM*	*IO*	*MI*	*MM*	*MO*	*OI*	*OM*	*OO*
II	*II*	*II*	*II*	*II*	*II*	*II*	*II*	*II*
II	*IM*	*IO*	*MI*	*MM*	*MO*	*OI*	*OM*	*OO*
IM	*IM*	*IM*	*IM*	*IM*	*IM*	*IM*	*IM*	*IM*
II	*IM*	*IO*	*MI*	*MM*	*MO*	*OI*	*OM*	*OO*
IO	*IO*	*IO*	*IO*	*IO*	*IO*	*IO*	*IO*	*IO*

$$\frac{II}{MI}\ \frac{IM}{MI}\ \frac{IO}{MI}\ \frac{MI}{MI}\ \frac{MM}{MI}\ \frac{MO}{MI}\ \frac{OI}{MI}\ \frac{OM}{MI}\ \frac{OO}{MI}$$

$$\frac{II}{MM}\ \frac{IM}{MM}\ \frac{IO}{MM}\ \frac{MI}{MM}\ \frac{MM}{MM}\ \frac{MO}{MM}\ \frac{OI}{MM}\ \frac{OM}{MM}\ \frac{OO}{MM}$$

$$\frac{II}{MO}\ \frac{IM}{MO}\ \frac{IO}{MO}\ \frac{MI}{MO}\ \frac{MM}{MO}\ \frac{MO}{MO}\ \frac{OI}{MO}\ \frac{OM}{MO}\ \frac{OO}{MO}$$

$$\frac{II}{OI}\ \frac{IM}{OI}\ \frac{IO}{OI}\ \frac{MI}{OI}\ \frac{MM}{OI}\ \frac{MO}{OI}\ \frac{OI}{OI}\ \frac{OM}{OI}\ \frac{OO}{OI}$$

$$\frac{II}{OM}\ \frac{IM}{OM}\ \frac{IO}{OM}\ \frac{MI}{OM}\ \frac{MM}{OM}\ \frac{MO}{OM}\ \frac{OI}{OM}\ \frac{OM}{OM}\ \frac{OO}{OM}$$

$$\frac{II}{OO}\ \frac{IM}{OO}\ \frac{IO}{OO}\ \frac{MI}{OO}\ \frac{MM}{OO}\ \frac{MO}{OO}\ \frac{OI}{OO}\ \frac{OM}{OO}\ \frac{OO}{OO}$$

The order of the combinations given is a general aid in placing sets of prints in files. It must be remembered however, that the first division or primary classification is first arranged in order; that is, if you have two formulas with the first division of one $\frac{1}{9}$ and the first division of the other $\frac{5}{2}$, the division $\frac{5}{2}$ would follow the one whose division is $\frac{9}{1}$ in the files. If there are two formulas having $\frac{9}{1}$ for the primary classification or first division; and the second division

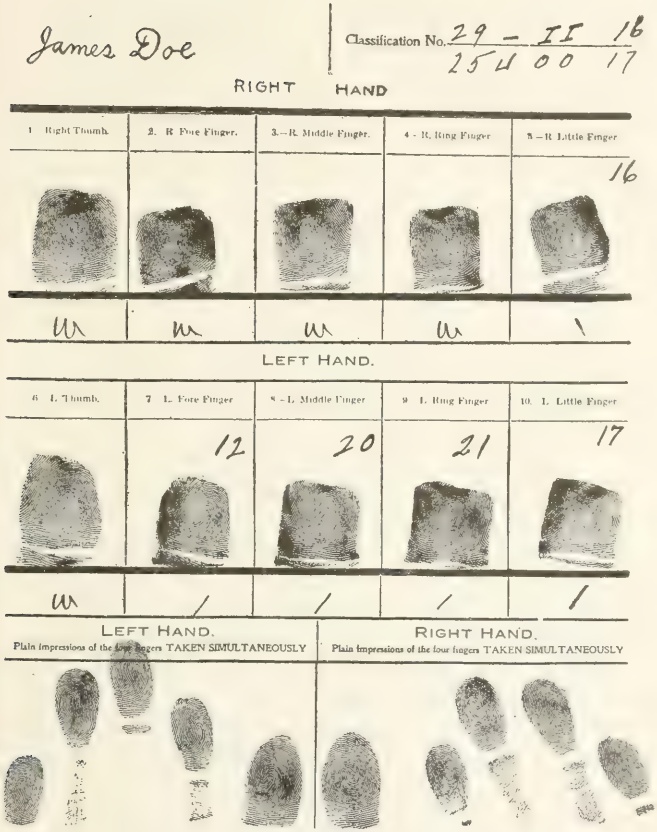


Figure 46.—A Set of Prints and Their Classification.

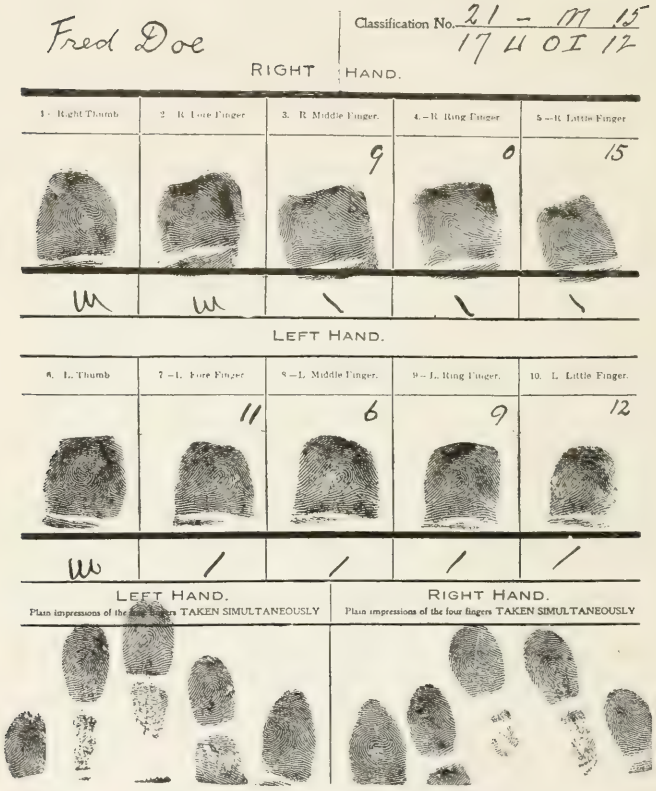


Figure 47.—A Set of Prints and Their Classification.

Robt. Doe

Classification No. 13 R OI 16
20 – O 13

RIGHT HAND.

1 Right Thumb	2 R. Fore Finger	3 – R. Middle Finger	4 R. Ring Finger.	5 – R. Little Finger.
	11	4		16
W	/	\	W	\

LEFT HAND.

6 L. Thumb	7 L. Fore Finger	8 – L. Middle Finger	9 L. Ring Finger	10 L. Little Finger
		5		13
W	W	/	W	/

LEFT HAND.
Plain impressions of the four fingers TAKEN SIMULTANEOUSLY

RIGHT HAND.
Plain impressions of the four fingers TAKEN SIMULTANEOUSLY

Figure 48.—A Set of Prints and Their Classification.

of one is $\frac{T}{A}$, while the second division of the other is $\frac{R}{A}$; the one having $\frac{R}{A}$ for its second division would follow the one whose second division was $\frac{T}{A}$. Again, if there are two formulas whose first division is $\frac{9}{1}$ with the second division $\frac{R}{U}$, and the third division $\frac{II}{II}$, while the third division of the other is $\frac{IO}{II}$; the third division $\frac{IO}{II}$ would follow the third division $\frac{II}{II}$.

If there were two sets, having the same first, second and third divisions; and if little finger count of one was *6*, while that of the other was *7*; the one having the *7* count in the little finger would follow that having the *6* count in the file.

The second, third and fourth divisions never vary in order no matter what the first division may be.

SEARCHING FILES

The finger print file has been likened to an encyclopedia. In fact it is an encyclopedia of prints, the primary classification or first division is the index; the sub-classification or second division the page; the second sub-classification

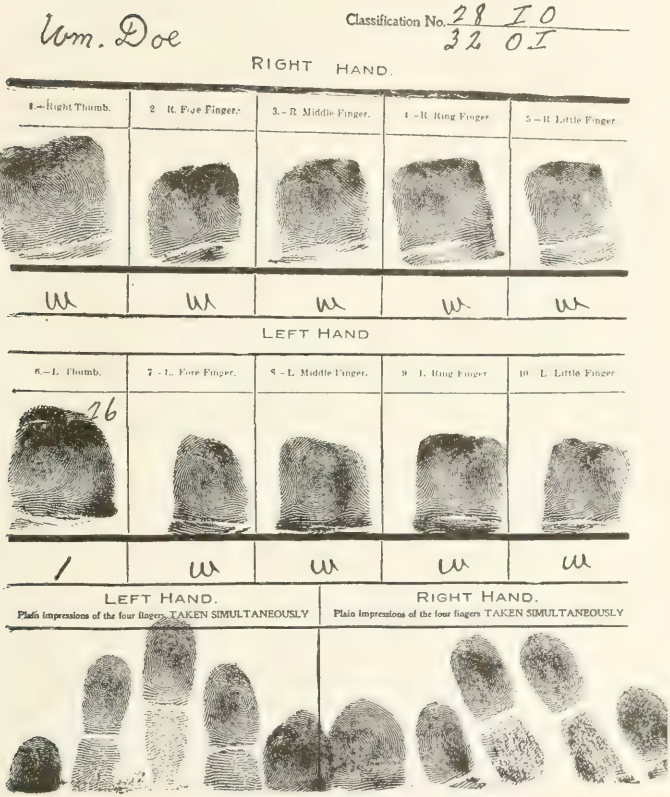
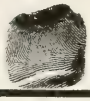


Figure 49.—A Set of Prints and Their Classification.

John Doe

Classification No. 32 O m
32 O m

RIGHT HAND.

1.—Right Thumb	2.—R. Fore Finger.	3.—R. Middle Finger.	4.—R. Ring Finger.	5.—R. Little Finger.
				
W	W	W	W	W

LEFT HAND.

6.—L. Thumb.	7.—L. Fore Finger.	8.—L. Middle Finger.	9.—L. Ring Finger.	10.—L. Little Finger.
	AMP			
W	W	W	W	W

LEFT HAND.
Plain impressions of the four fingers TAKEN SIMULTANEOUSLY

RIGHT HAND.
Plain impressions of the four fingers TAKEN SIMULTANEOUSLY

Figure 50.—A Set of Prints and Their Classification.

or third division the paragraph, the final classification or fourth division the line in the paragraph.

Assume that you have a set of prints and are desirous of searching the files to ascertain if such a set of prints has a duplicate. You obtain a formula for the set of prints. The first division of the formula will refer you to a cabinet section or pigeon hole. In this section you find the sub-classification or second division. Following this you have the third division formula, which corresponds to the formula of the set of prints for which you wish to search. Compare the third division formula of the set being searched with the third division formula already in the file, providing such sets have no little finger count. If such sets have a little finger count, this count determines the scope of search. If the little finger count of the print for which you are making search is *10*, you compare your formula with same file formula having a count of *10*. Failing to find a duplicate, compare with *11* and *12* counts; then turn back and compare *9* and *8* counts. By following this practice the operator is allowing two counts either way for any error that may occur in ridge counts.

Comparing Impressions.— Every finger print impression has individual characteristics. These characteristics distinguish an individual print from all other prints. Not so noticeable at first

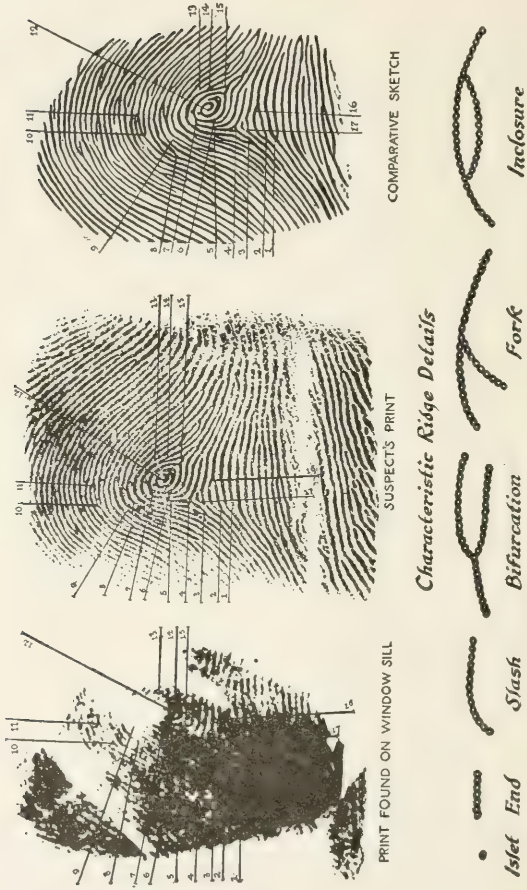


Figure 51.—Comparing the Impressions.

are some of these tell-tale marks, but all are clear and unquestionable upon close observation.

Following are the characteristics used in making comparisons:

General Characteristics
1. Core Formation
2. Delta Formation
3. Flow of Type Lines

Individual Characteristics
1. Islet
2. Slash
3. Bifurcation
4. Fork
5. Enclosures

In Figure 51 is illustrated the method of comparison.

CHAPTER VI

REVIEW

Q. What are finger prints?

A. Finger prints are the impressions of the inner surface of the nail joints of thumbs and fingers.

Q. What articles are required for taking finger prints?

A. (1) tube of printers' ink, (2) rubber roller, (3) a small block or slab about six inches wide and ten inches long covered by a sheet of tin, (4) a table about four feet high, three feet long and two feet wide, (5) a finger print frame for holding blanks, (6) a little gasoline for cleaning purposes.

Q. How are finger prints taken?

A. The following is the method of taking finger prints: Place a small quantity of ink on the marble slab, then roll the roller over it until it is thoroughly inked all around; then distribute over the top of the tin or copper covered wooden block until the entire surface is evenly coated with a thin layer of ink. The fingers having

been previously washed with soap and soft or warm water, then thoroughly dried. The operator then takes his position on the left of the subject and places the bulb of the right thumb upon the tin or copper-covered slab, the plane of the nail being at right angles to the plane of the slab; the thumb is turned over until the bulb surface which originally faced to the left now faces to the right, the plane of the nail again being at right angles to the slab.

The thumb being now properly inked for a rolled impression, it is placed on the finger print blank by the same mode prescribed as for inking; the index, middle, ring and little fingers are then inked; each individually; in the manner mentioned and described for the thumb. The impressions of the left hand are then taken in the same manner as for the right hand, except that the operator places the outer joint of the finger so that the plane of the nail is at right angles, rolling the finger until the plane of the nail is again at right angles.

After the rolled impressions have been taken, the outer joints of the index, ring, middle and little fingers, both hands, are again placed on the slab (but not rolled) and simultaneous impressions are then taken in the spaces provided therefor at the bottom of the blank. Plain impressions of the thumbs are then taken and placed in their relative positions.

Q. How many kinds of finger prints are there?

A. Two kinds, the rolled print and the plain print.

Q. What is a rolled print?

A. A rolled print is one showing the whole inner surface of the nail joint.

Q. What is a plain print?

A. A plain print is one showing only the direct front or ball of the finger or digit.

Q. Of what does a finger print consist?

A. A finger print consists of ridges and depressions, or black and white lines, the black lines representing ridges, the white lines representing depressions.

Q. What is meant by "fixed points" in finger prints?

A. There are certain points found in finger prints with regularity. These points determine the class or type of an individual print, and are known as *core, delta* and *type lines.*

Q. What is a core?

A. The core is the center of the apex of the inside ridge of a loop or the center of the innermost coil of a whorl.

Q. What are type lines?

A. Parallel lines which enter the finger print near the lower corner or corners, flow upward

and inward to a point near the type formation, where they diverge and form the delta location.

Q. What is a delta?

A. A delta is a dot, bifurcation, broken line or short line situated directly between the type lines at their divergence.

Q. How many types or patterns are there in finger prints? Name them.

A. There are ten distinct types found in finger prints. The plain arch, the tented arch, the exceptional arch, the radial loop, the ulnar loop, the whorl proper, the central pocket loop, the twinned loop, the lateral pocket loop and the accidental.

Q. What is a plain arch?

A. A plain arch is a type in which the ridges flow from one side of the impression to the other without recurving, slightly raising in their course at midway.

Q. What is a tented arch?

A. A tented arch is a type in which the ridges flow from one side to the other without recurving, abruptly raising to a point or perpendicular position near the center.

Q. What is a radial loop?

A. A radial loop is a loop whose ridges recurve and form a downward slope towards the thumb.

Q. What is an ulnar loop?

A. An ulnar loop is a loop whose ridges recurve and form a downward slope toward the little finger.

Q. What is a whorl proper?

A. A whorl proper is a type showing two deltas and one core, of an oval or circular spiral formation.

Q. What is a central pocket loop?

A. The central pocket loop is a type resembling the loop in formation but whose central ridge or ridges recurve and cross the axis of the loop at right angles to the delta.

Q. What is a twinned loop?

A. A twinned loop is a type showing two deltas and two cores, the outlets of the ridges immediately around the cores are separated by a delta.

Q. What is a lateral pocket loop?

A. A lateral pocket loop is a type showing two deltas and two cores; the outlets of the ridges immediately about the cores in this type are not separated by a delta.

Q. What is an accidental?

A. The accidental is a complex of two or more types in a single impression. They are sometimes fully and sometimes partially formed.

Q. What types are subdivided?

A. The loop type and the whorl type are subdivided.

Q. How is the loop type subdivided?

A. The loop type is subdivided by ridge counting.

Q. How is the whorl type subdivided?

A. The whorl type is subdivided by ridge tracing.

Q. What is ridge counting?

A. Ridge counting is the method of ascertaining the exact number of ridges between the core and the delta in the loop type.

Q. What is ridge tracing?

A. Ridge tracing is the method by which the whorl type is subdivided. The lower line forming the left delta is traced to the right delta or to a point even with the right delta. The position of the line traced at the stopping point with right delta determine the subdivision of the type.

Q. What is meant by classifying?

A. Classifying is the method of obtaining a formula for a set of prints.

Q. How many kinds of classifications are there?

A. There are two kinds of classifications, the

lettered classification and the non-lettered classification.

Q. What is a lettered classification?

A. A lettered classification is a classification obtained from a set of prints in which the plain arch, tented arch or exceptional arch is found in one or more of the digits or where the radial loop is shown in digits other than the index fingers.

Q. What is a non-lettered classification?

A. A non-lettered classification is a classification obtained from a set of prints in which the plain arch, tented arch or exceptional arch is not shown in any of the digits composing the set, and where the radial loop is found only in the index fingers.

Q. How many divisions are there in the non-lettered classification?

A. There are four divisions in the non-lettered classification, namely: (1) primary classification, (2) sub-classification, (3) second sub-classification, (4) final classification.

Q. What is the primary classification?

A. The primary classification is the main classification, the key to the filing cabinet, and is expressed in numbers.

Q. What is the sub-classification?

A. The sub-classification is the second division of the formula. It consists of the letters designating the type found in the right and left index fingers.

Q. What is the second sub-classification?

A. The second sub-classification is the third division of the formula, the result of ridge counting and ridge tracing, and of types in the index and middle fingers of both the right and left hands.

Q. What is the final classification?

A. The final classification is the number of ridge counts found in the right little finger, and the ridge counts found in the right thumb.

Q. What is grouping?

A. Grouping is separating all types into two classes, known as the non-numerical group and the numerical group.

Q. What types constitute the non-numerical group?

A. The plain arch, tented arch, exceptional arch, radial loop and ulnar loop.

Q. What types constitute the numerical groups?

A. The whorl proper, the central pocket loop, the lateral pocket loop, twinned loops and accidental.

Q. What is a set of prints?

A. A set of prints includes the impressions of both right and left digits.

Q. Why are sets of prints separated into pairs?

A. A set of prints is separated into pairs for the purpose of obtaining the primary or main classification.

Q. How are missing or deformed digits classified?

A. Missing or damaged digits are classified the same as the corresponding digits of the opposite hand. Should the same digits be missing on both hands, the missing digits are classified as meet whorls.

Q. Why is the third or ring finger valuable to the second sub-classification?

A. Because its use gives scope as well as simplifying the files. The additional divisions obtained by using the ring finger are indispensable to a large file.

Q. To what may the filing cabinet be likened?

A. The filing cabinet may properly be termed the encyclopaedia of finger prints.

Q. How are sets of prints filed?

A. Prints are filed first according to the primary classification, which is expressed in num-

bers, and filed in numerical order; the sub-divisions, including the first sub-division and the second sub-classing are filed in alphabetical order, with one exception, the *T* precedes the *R*. The final classification, expressed in whole numbers, is filed in numerical order.

Q. How is a search made in the files?

A. The search is made in the files by elimination: you have a set of prints and wish to make a search in the files for them; you first obtain a formula or classification for the set of prints you wish to search for. Having obtained the formula, you first consider the primary classification, this refers you to an individual section of the file; the next consideration is the sub-classification, then the second sub-classification and the final classification. By this method you find in the files the classification corresponding to the set of prints for which you wish to make search. The little finger count or the final division of the formula determines the scope of the search. If the little finger count of the print you are searching is *9*, all the same formulas in the file with the little finger count of *9* are considered; failing to find your print you search through *10* and *11*, then turn back and search through *8* and *7*, always allowing two counts below and two above for error in classifying.

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